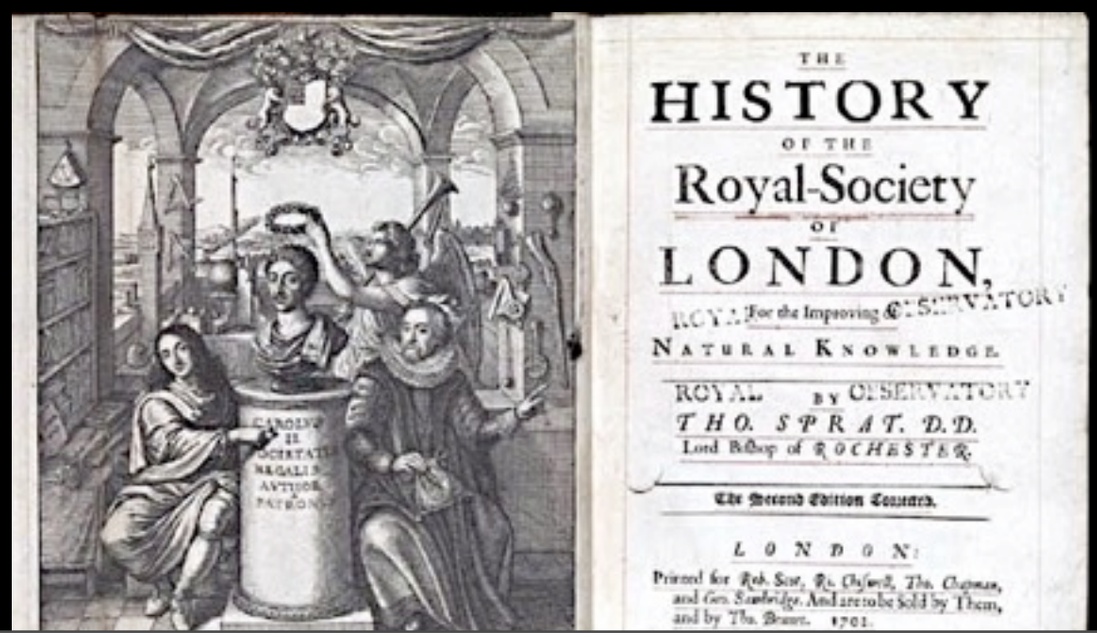
Making of the Western Mind Institute for the Study of Western Civilization

Week 25, Galileo

1. Science in the Ancient World: Greece
   Science in the Ancient World: Israel
2. Science in the Middle Ages
3. Science in the Ren-Ref

4. Science and Time
5. Science in the Seventeenth Century



Think of Western Civilization as a suspension bridge
It is always in tension and has to be.
Western Pillar is Ancient Greece
Eastern Pillar is Ancient Israel

The
Ancient
Jews
give us
the week.

Time
Week
Clock
Science

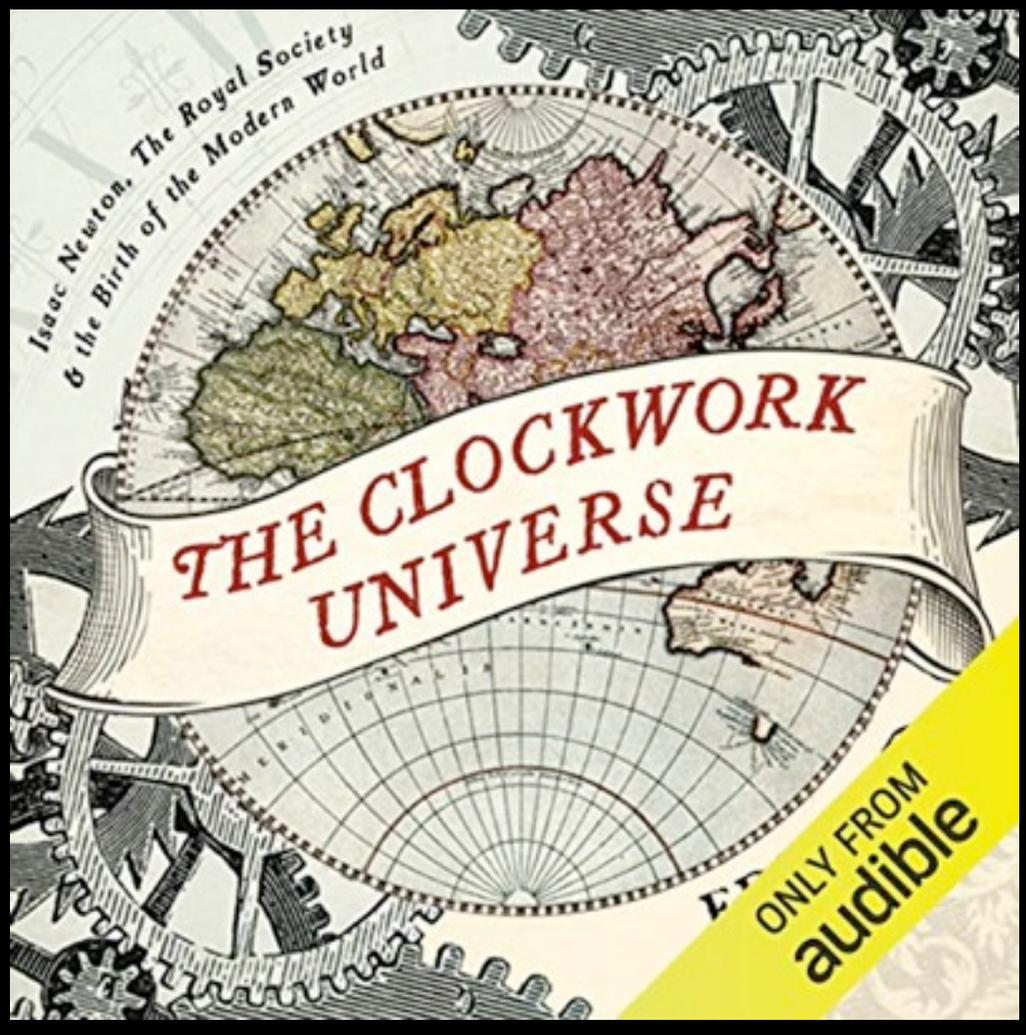

1400 GREEK COMES TO FLORENCE
Now Greek Mss. can be rescued
Brought to European libraries

THE REFORMATION AND SCIENCE

freedom of speech
freedom of print
freedom of conscience

Oct 31, 1517
Luther Posts
the
Ninety-Five
Theses

Knowledge of Time, Measurement of Time and Science Inextricably Linked



THE CLOCKWORK UNIVERSE

SCIENCE AND TIME

SCIENCE TIME AND MODERNITY

MODERNITY=CHANGE

CHANGE REQUIRES A CLOCK TO KEEP TRACK OF THINGS

SCIENCE REQUIRES A CLOCK (Experiments)

THE CLOCK/WATCH is the SINGLE MOST CENTRAL DEVICE OF MODERNITY

A Revolution in Time and Science

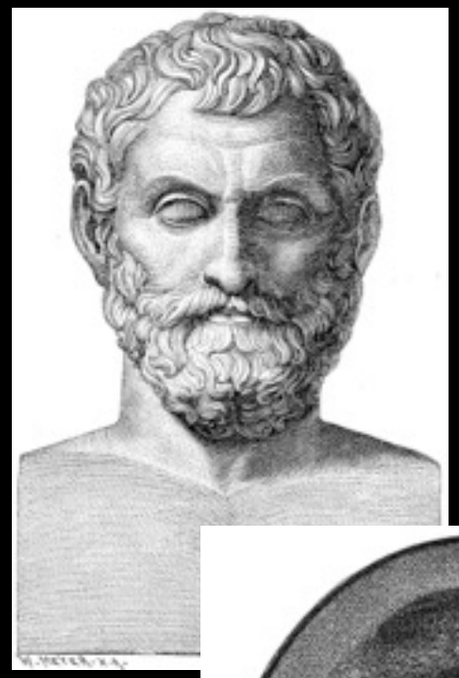
Mechanical Clocks

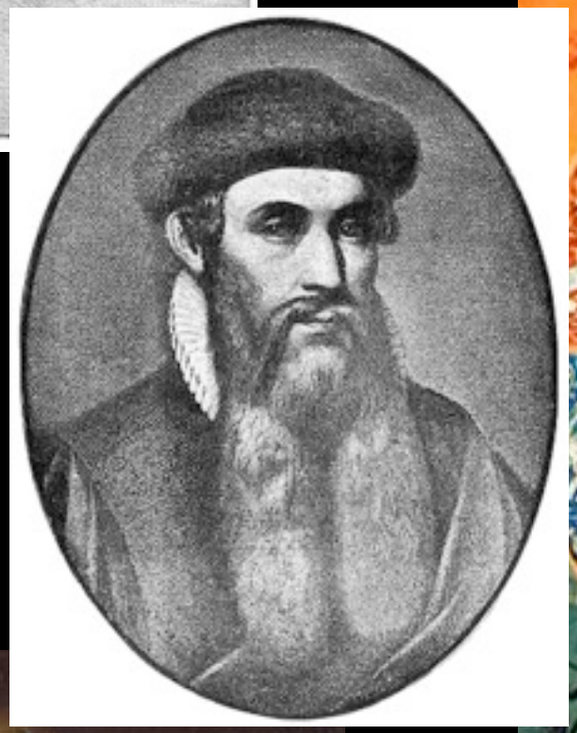
better than sand clocks, better than water clocks

better than sundials.

Mechanical clocks create THE EQUAL HOUR

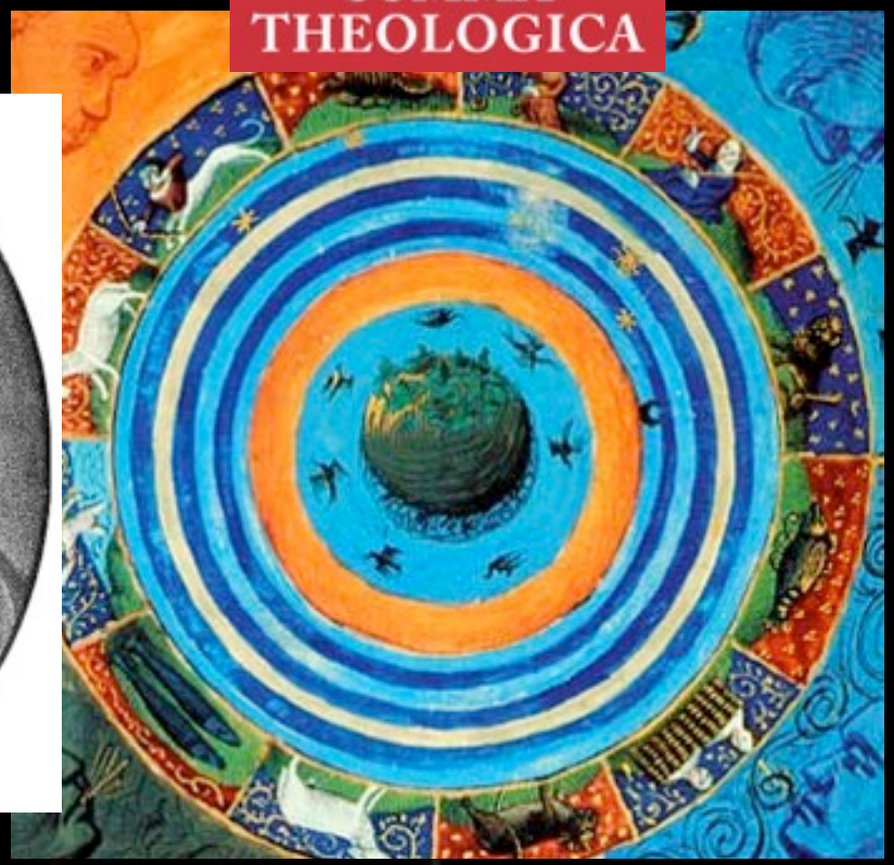
1300-1400

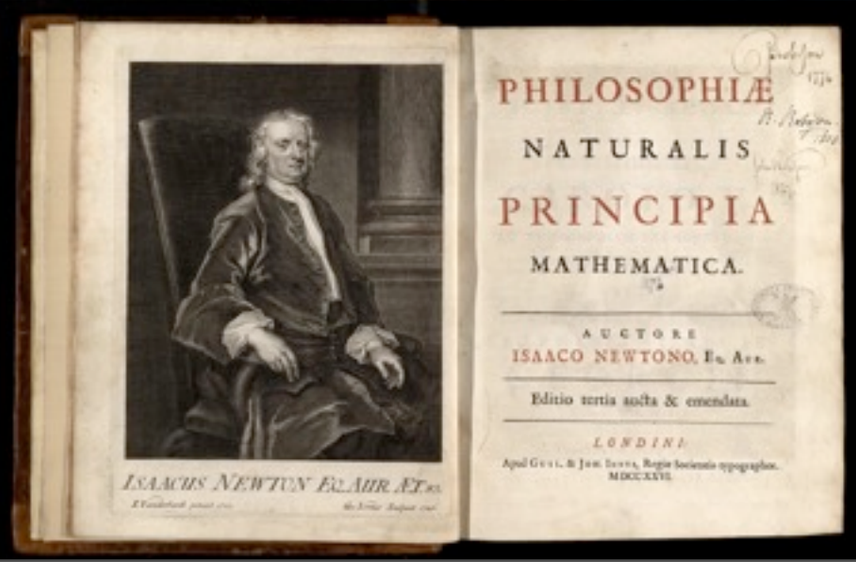




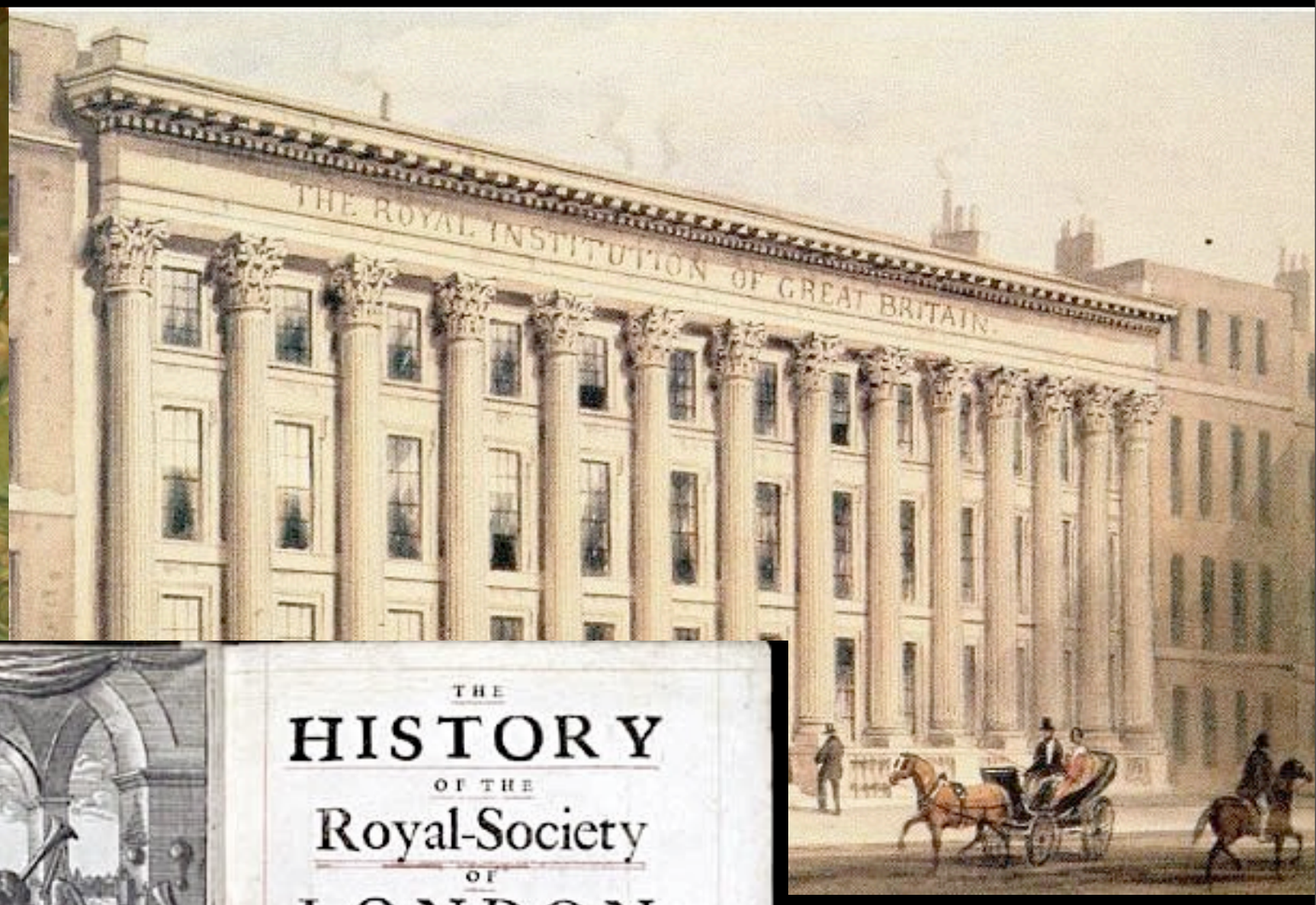
THOMAS AQUINAS

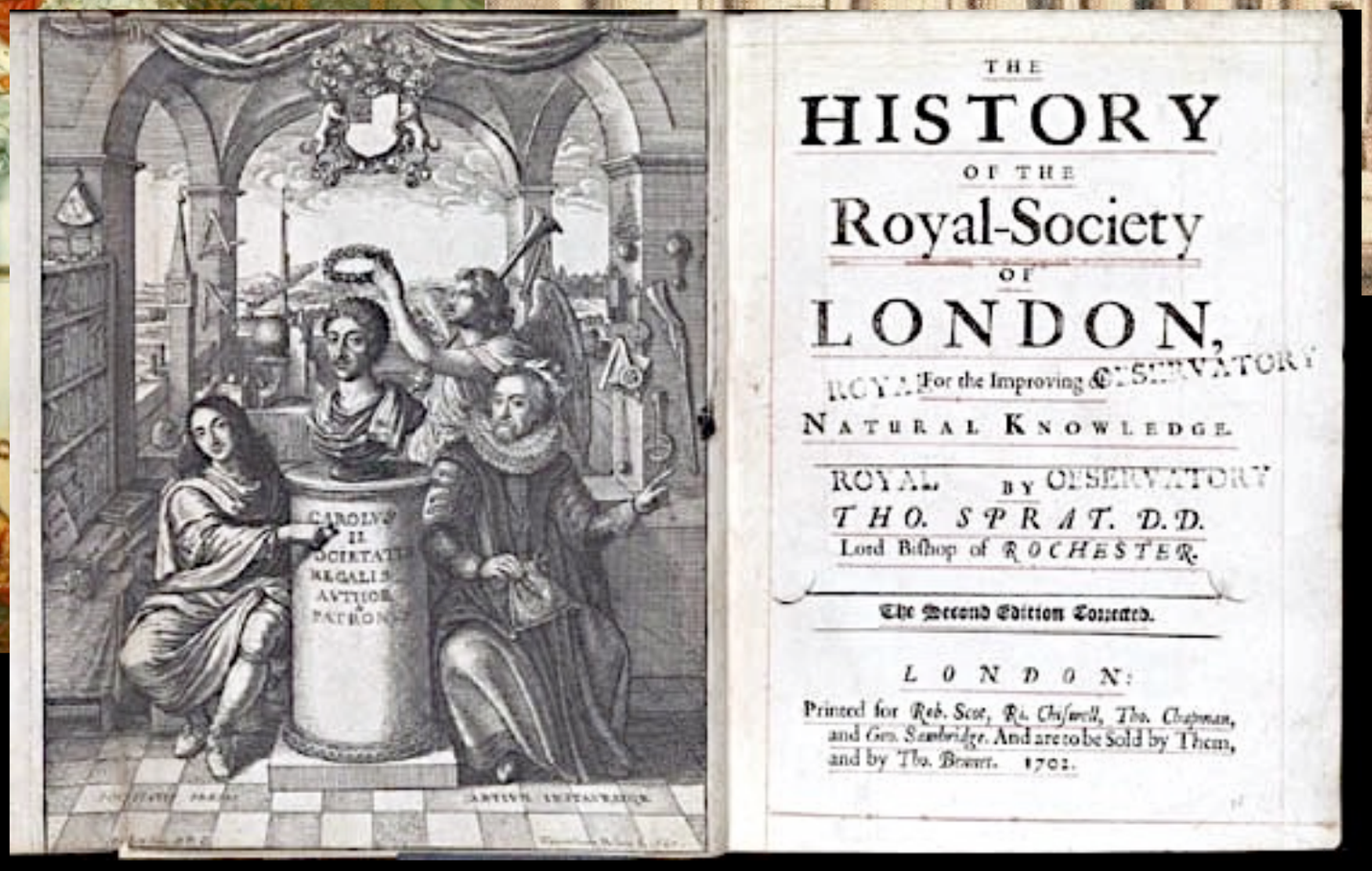
SUMMA THEOLOGICA





Foundation of the Royal Society,Founded in November 1660, it was granted a Royal Charter by King Charles II.





THE
HISTORY
OF THE
Royal-Society
OF
LONDON,
ROYAL For the Improving of NATURAL KNOWLEDGE.

ROYAL BY OBSERVATORY
THO. SPRAT. D.D.
Lord Bishop of *ROCHESTER.*

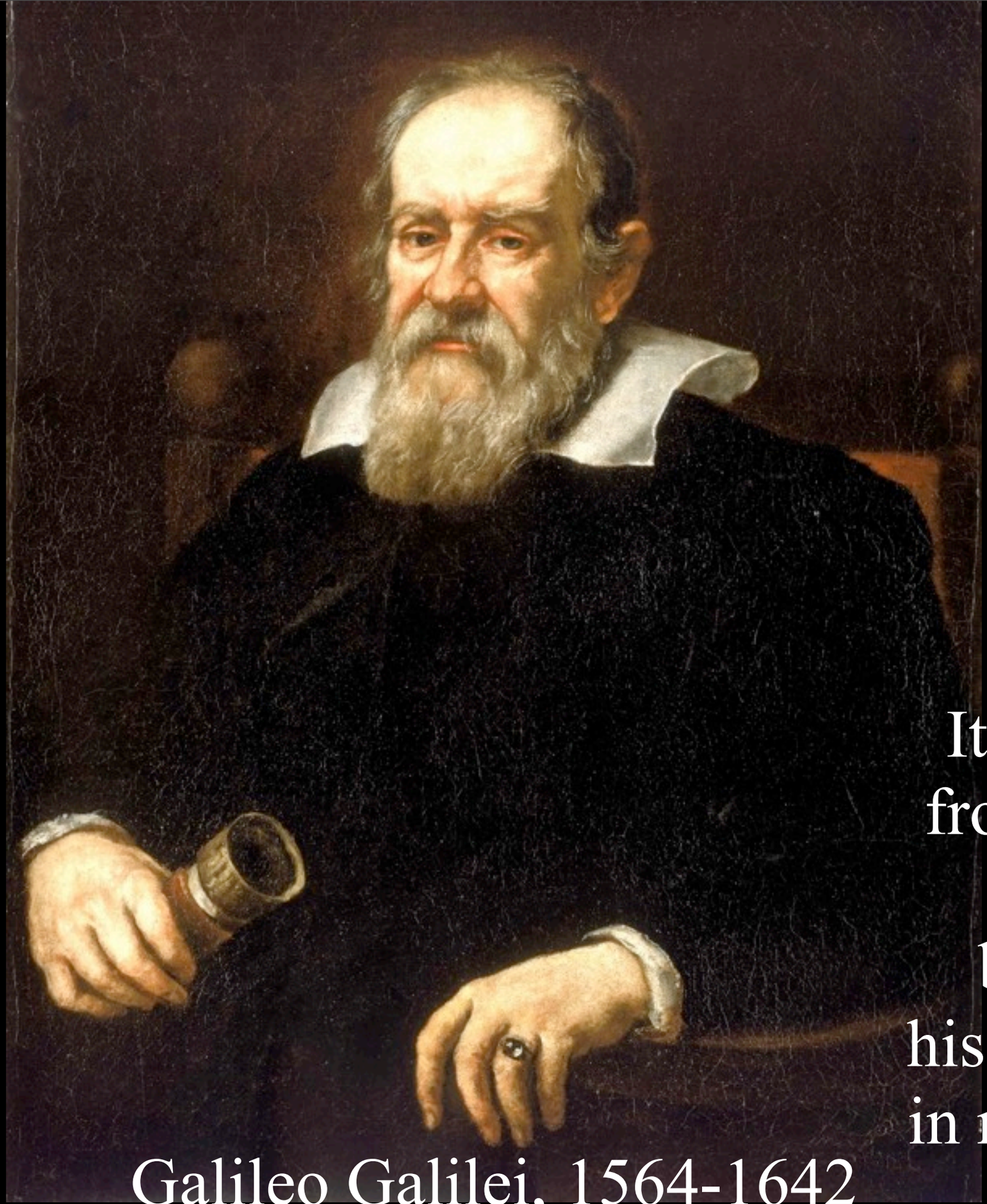
The Second Edition Corrected.

LONDON:
Printed for *Rob. Scot, Ri. Chiswell, Tho. Chapman,* and *Geo. Sawbridge.* And are to be Sold by Them, and by *Tho. Brewer.* 1702.

Beginning of Modern Science

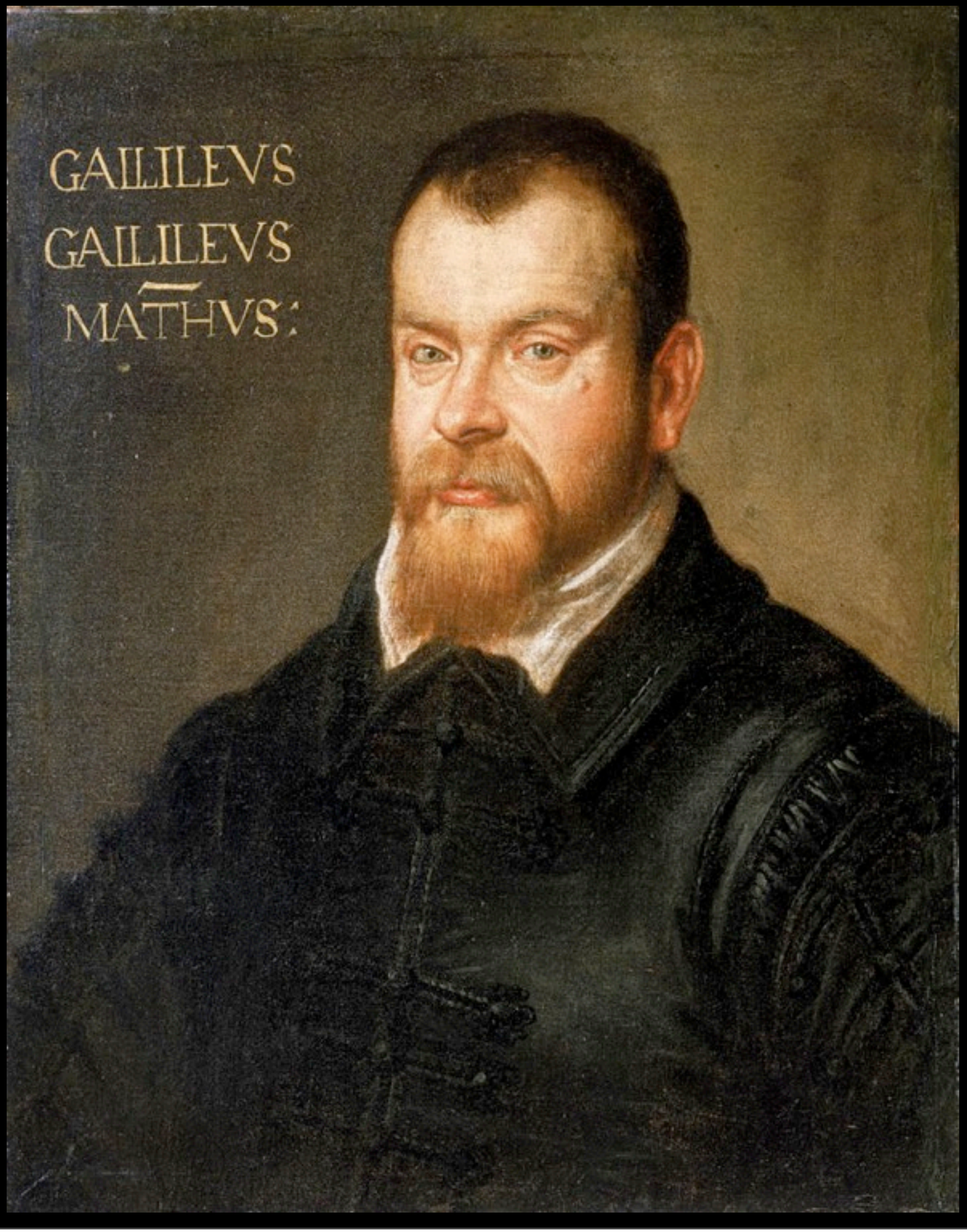
1530 **Paracelsus**(1493-1541), founder: toxocology, apply chemistry to physiology, pathology
1543 Nicholas **Copernicus**, De revolutionibus orbium coelestium
1543 Andreas **Vesalius**(1514-1564), De humani corporis fabrica ANATOMYsupplants Greek Galen
1546 Agricola (1494-1555), De natura fossilium, introduces term "fossil", rocks, mineralogy
1589 **Galileo** (1564-1642), experiments with falling bodies (experimental method)
1600 William Gilbert, De magnete, magnetisque coporibus, magnetic properties of earth
1608 Hans Lippershy, (1570-1619) invents telescope, Middleburg, Zeeland, Holland
1609 Johannes **Kepler** (1571-1630) laws of planetary motion, Astronomia Nova.
1610, **Galileo**, Starry Messenger, printed Venice. new planets Implication: Copernicus right.
1620, Francis **Bacon** (1561-1626), Novum organum, (The New Method)
1628, William **Harvey** Exercitatio anatomica de motu cordis et sanguinus in animalibus
first to describe circulation of blood and function of heart, rejects Greeks/Aristotle
1637, **Descartes** "La Geometrie" founds modern analytical geometry
1638 Galileo, Discorsi e dimostrazioni matematiche, foundation of modern mechanics
1662, **Royal Society** July 16, King Charles II grants charter, (Hooke, Newton, Boyle)
On 28 November 1660, the 1660 committee of 12 announced the formation of a "College for the Promoting of Physico-Mathematical Experimental Learning", which would meet weekly. discuss science and run experiments. publish newsletter, articles of Royal Society 1st journal
1661 **Robert Boyle** (1627-1691), Skeptical Chymist founds elements/analysis of chemistry
1676 **Anthony van Leeuwenhoek** discovers micro-organisms with microscope
1687 **Isaac Newton**, Philosophiae naturalis principia mathematica,
universal gravitation and the laws of motion.

Galileo Galilei, 1564-1642



Galileo Galilei, 1564-1642

Galileo's
life and work
will show the
impossibility of
higher authorities
in Europe trying to
close down
unwelcome
scientific research.
It is true they stop him
from further publication
IN ITALY,
but they cannot stop
his ideas from circulating
in rest of world of 17th C
European printing.


GAILILEVS
GAILILEVS
MATHVS:


Pisa
Ljubljana
SLOVENIA
Zagreb
CROATIA
BOSNIA-H.
Sarajevo
Udine
Trieste
Vicenza
Venezia
Padova
Verona
Milano
Bergamo
Torino
Parma
Ferrara
Bologna
Genova
La Spezia
San Remo
Rimini
Firenze
Ancona
Perugia
Pescara
Foggia
Bari
Le Murge
Taranto
Napoli
Ischia
Capri
Cosenza
Isole Lipari
Palermo
Messina
Catania
Etna
Rome
Sassari
Sardinia
Cagliari
Corsica
Ajaccio
Elba
Adriatic Sea
Tyrrhenian Sea
Ionian Sea
Mediterranean
Ligurian Sea
Appennino Ligure
Appennino Tosco-Emiliano
Appennino Abruzzese
Appennino Napoletano
Appennino Lucano
Mti Nebrodi
Gulf of Taranto

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SaturdayMay 23, 2020

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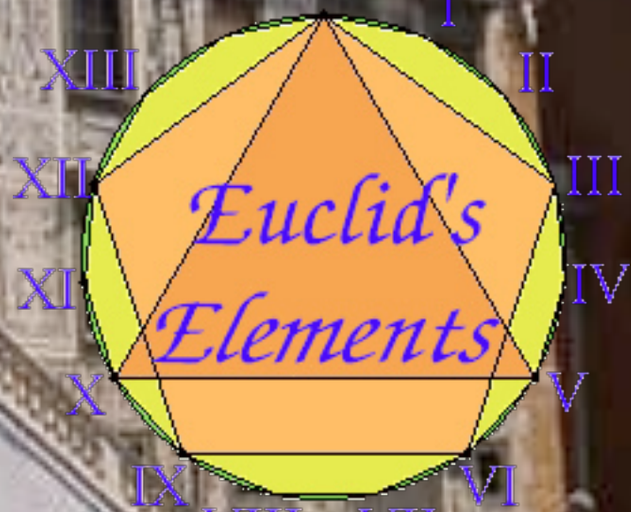
University of Pisa, 1581, Galileo enrolls, medicine

"In right-angled triangles the square on the side subtending the right angle is equal to the squares on the sides containing the right angle."

Euclid



Impediments of Academic Gown

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1583-1585, begins to challenge Aristotle

OVERTHROW OF ARISTOTLE

(Aristotle vs. 17th C)

Descartes/Bacon/Galileo

SCIENTIFIC METHOD-TEST THINGS-EXPERIMENT

first small things, later big things(universe)

1. falling bodies

Aris said they fall according to their weight

but Gal saw hailstones falling together

went to Tower and tested/diff weights fell together

thus idea of some other force (gravity??)

KEY: CAREFUL MEASUREMENT(=Descartes)

2. pendulum/church lamp/swing/arc/speed

some other force?

SaturdayMay 23, 2020

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KEY: CAREFUL MEASUREMENT(=Descartes)

2. pendulum/church lamp/swing/arc/speed

some other force?

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body in motion tends to stay in motion
body at rest tends to stay at rest

UNLESS SOME FORCE PUSHES

LAMP: earthquake or cleaner pushes
PERIOD of SWING
independent of size, amplitude,
time it takes to swing back and forth
always the same no matter how far you pull
SEEMS OPPOSITE OF WHAT WE EXPECT
GALELEO: must be **some other force** (gravity)

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1589 appt Prof of Math at Pisa / poor pay / poor prestige
at this time still accepts Ptolemaic cosmology

Science and the language of science

"**Philosophy is written in this grand book the universe**, which stands continually open to our gaze. . . .But the book cannot be understood unless one first learns to comprehend the language and to read the alphabet in which it is composed. It is written in the **language of mathematics**, and its characters are triangles, circles,and other geometric figures, without which it is humanly impossible to understand a single word of it; without these one wanders around in a dark labyrinth."

"I say that the **human intellect does understand some propositions perfectly**, and thus in these it has as much absolute certainty as has Nature herself. **Those are of the mathematical sciences alone**; that is, geometry and arithmetic, in which the Divine intellect indeed knows infinitely more propositions than we do, since it knows all. Yet with regard to those few which the human intellect does understand, **I believe that its knowledge equals the Divine in objective certainty** – for here it succeeds in understanding necessity, than which there can be no greater certainty."(Dialogue)

Invited to Lecture in Florence on structure of Dante's Hell

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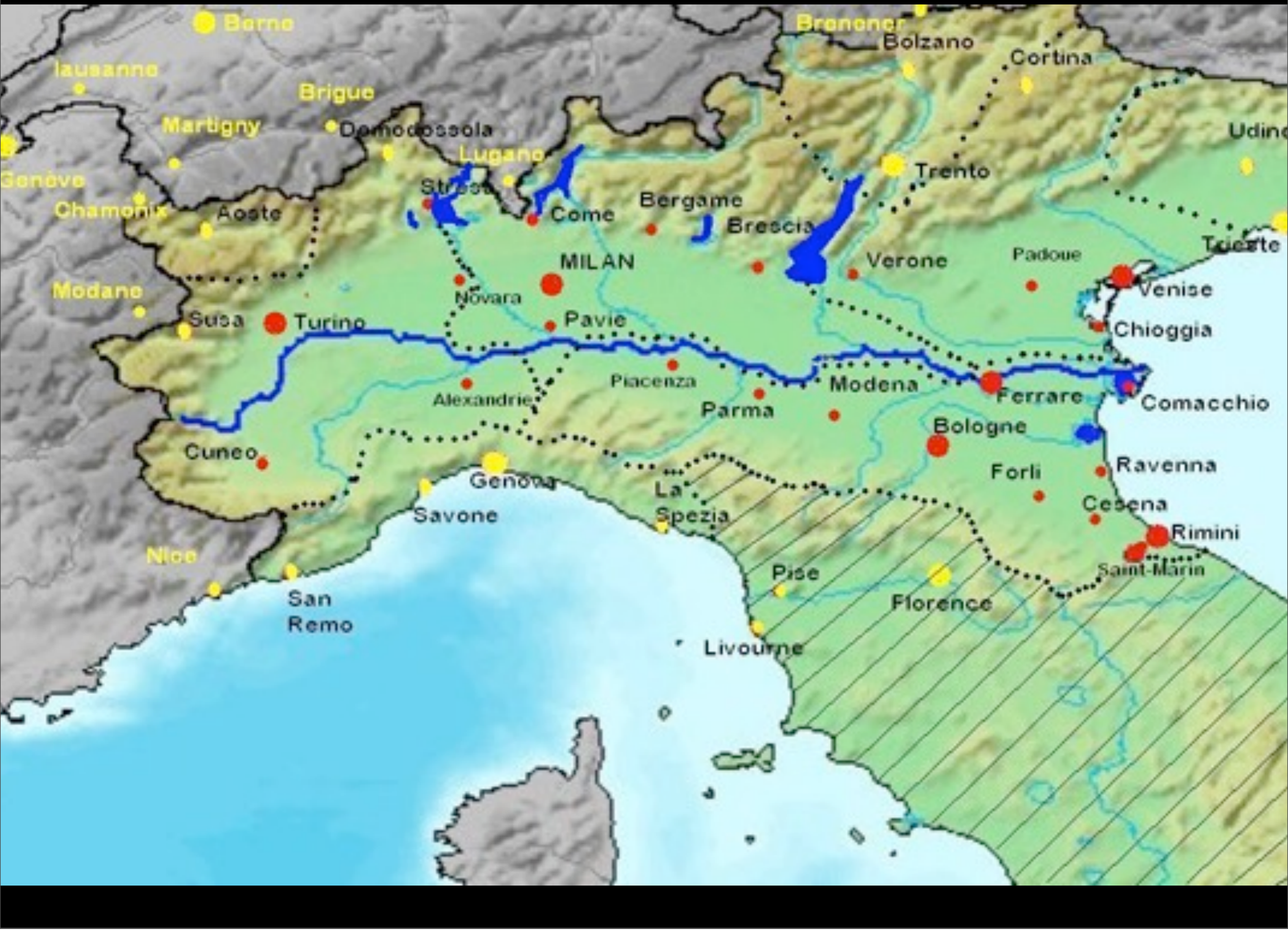
UNIVERSITÀ
DEGLI STUDI
DI PADOVA

1592, appointed Professor of Mathematics
University of Padova



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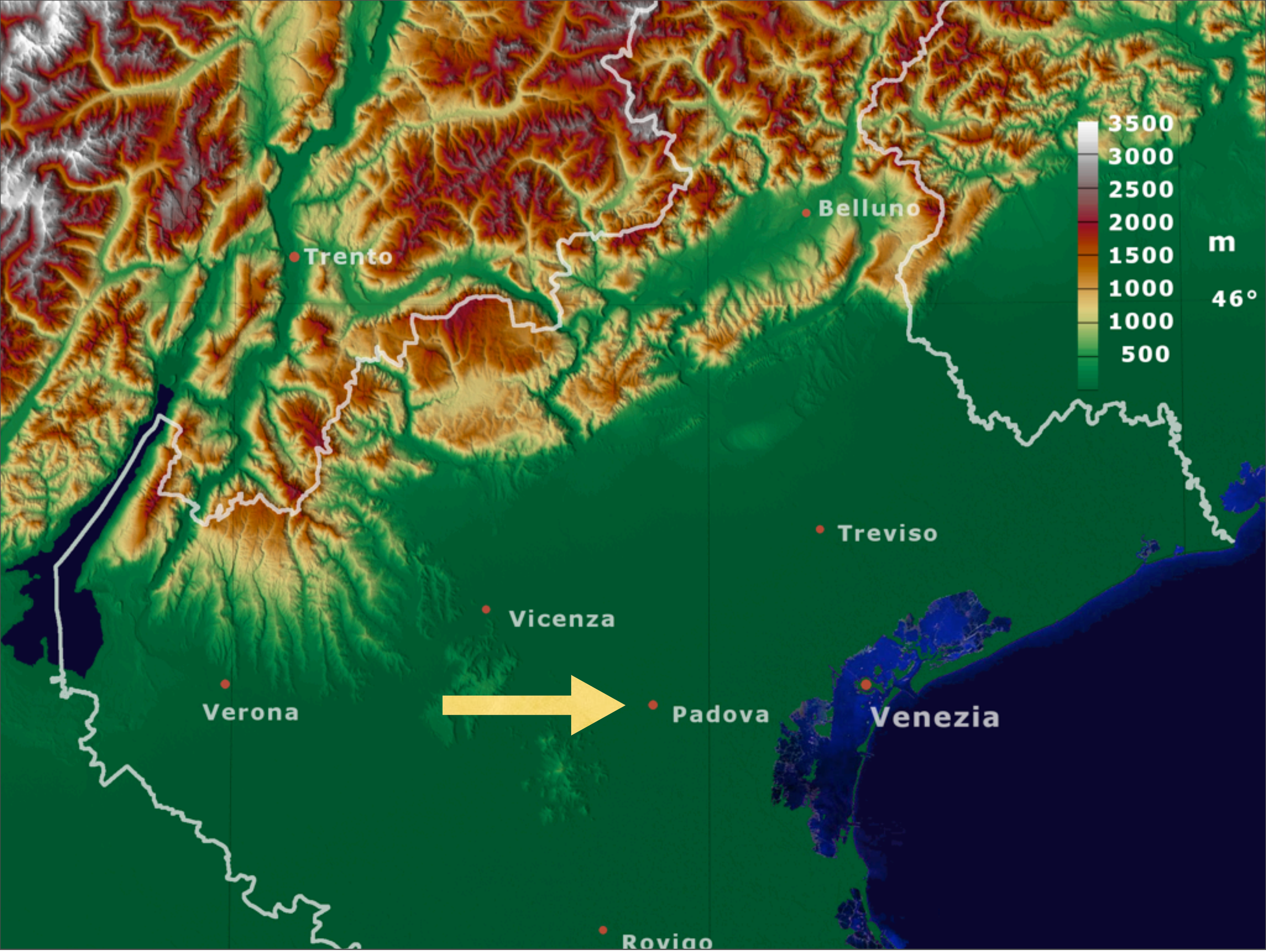

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Saint Anthony of Padua
1195 – 1231
was a Portuguese Catholic priest and friar of the Franciscan Order. He was born and raised by a wealthy family in Lisbon and died in Padua, Italy. Noted by his contemporaries for his forceful preaching and expert knowledge of scripture.

Hotel Donatello

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SaturdayMay 23, 2020


Mercatino Italiano
EL 414HD

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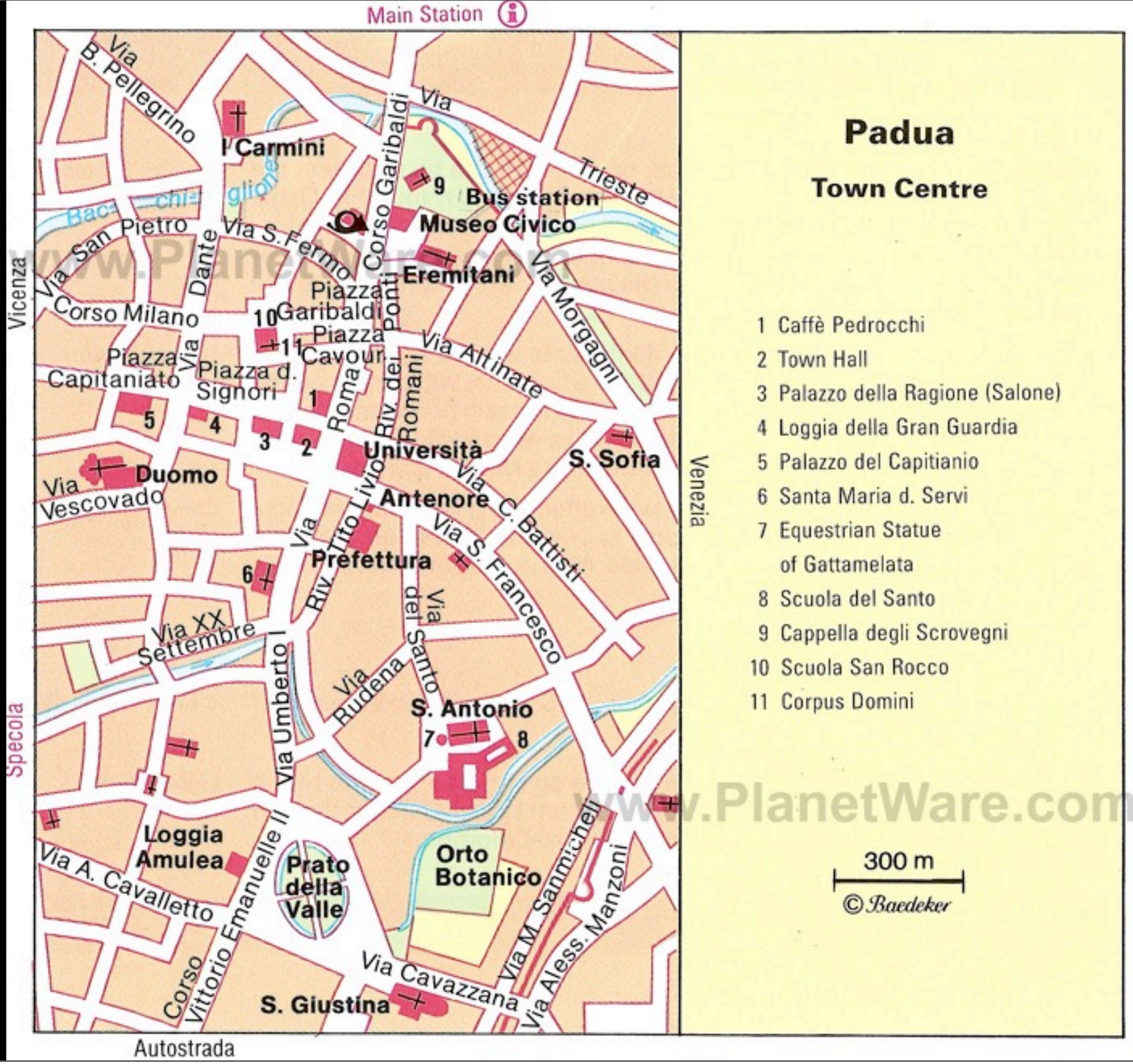
SaturdayMay 23, 2020

VIA ROMA SHOPPING CENTER OF PADUA

Padua

Town Centre

1 Caffè Pedrocchi
2 Town Hall
3 Palazzo della Ragione (Salone)
4 Loggia della Gran Guardia
5 Palazzo del Capitianio
6 Santa Maria d. Servi
7 Equestrian Statue of Gattamelata
8 Scuola del Santo
9 Cappella degli Scrovegni
10 Scuola San Rocco
11 Corpus Domini



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Length: 60 feet
Width: 24 feet
Height: 36 feet
Sistine: 134 feet long, 44 feet wide, 68 feet high

THE LIFE OF JESUS OF NAZARETH

1. Stories of Mary's parents: Joachim, Anna
2. Stories of Mary, Marriage
3. Birth of baby Jesus, Egypt
4. Jesus adult: Baptized by John
5. Apostles, Last Supper
6. Arrest, Death, Resurrection

SaturdayMay 23, 2020


30
0 - 24
via g. galilei
Palazzo Zabarella
PIAZZE - DUOMO - LISTON
Museo civico - Giotto
Casa di Galileo
Collegio Tornacense
VIA S. FRANCESCO

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GALILEO GALILEI
GIÀ VISSE
DI QUI
DIEDE AL MONDO IL PRIMATO
DELLA RAGIONE E NOSTRA
E QUI EBBE SUO OTIO
LA LINGUA DI BUZZANTE
CHE SUSSUMO
A CUI NON FOSSE STATA MATTINA
SEPPE SCRIVERE COME UN DÌ
L'UNIVERSITÀ DI PADOVA
P
MCMLIX


GLI ULTIMI
DEI SUOI FULGIDI ANNI PADOVANI
1592 – 1610
GALILEO GALILEI
QUI VISSE
DI QUI
DIEDE AL MONDO IL PRESAGIO
DELL'ERA NASCENTE E NOSTRA
E QUI FU SUO OZIO
LA LINGUA DI RUZZANTE
CHE NESSUNO
A CUI NON FOSSE STATA MATERNA
SEPPE SCRIVERE COME LUI
L'UNIVERSITÀ DI PADOVA
P
MCMLIX


GALILEO GALILEI
GIÀ VISSE
DI QUA
DIEDE AL MONDO IL PRESAGIO
DELL'ERA NASCENTE E NOSTRA
E QUI EBBE SUO ORTO
LA LINGUA DI BUZZANTE
CHE NESSUNO
A CUI NON FOSSE STATA MATTINA
SEPPE SCRIVERE COME LUI
L'UNIVERSITÀ DI PADOVA
P
MCMLIX

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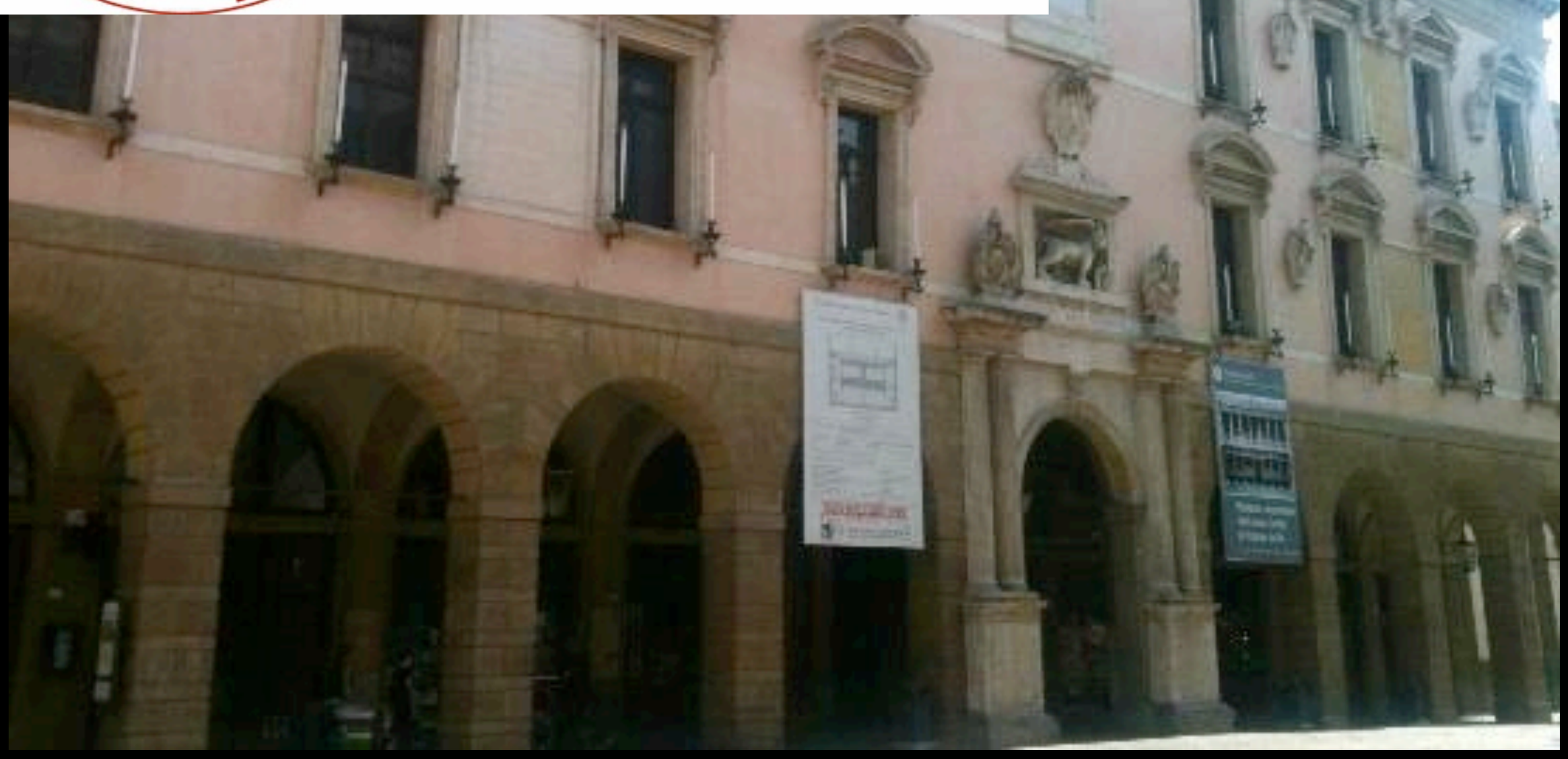
VIA ROMA SHOPPING CENTER OF PADUA

Piazza Cavour with Camillo Cavour

SaturdayMay 23, 2020


www.padovafiere.it
De Chirico
PADOVA
PALAZZO
ZABARELLA

Università degli Studi di Padova



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SaturdayMay 23, 2020

VIA ROMA SHOPPING CENTER OF PADUA

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SOIA VERDE
€ 3,80
PISELLI GIALLI
€ 4,50
CANNELLINI Toscani
€ 4,00
LANCIA
€ 7,00
PEPERONCINO
SBRICIOLATO
SAN MATTEO
€ 5,50
DALL'OLIO
VERDONA
O (XARETI)
€ 4,50
ZUPPA GIULIO
€ 6,50
€ 6,50
13,00
€ 6,00
€ 6,00
€ 6,00
€ 5,00
€ 6,00
€ 4,00
€ 3,80


CACIOTTA
MAN CANDIDO
€ 1.00
CERA

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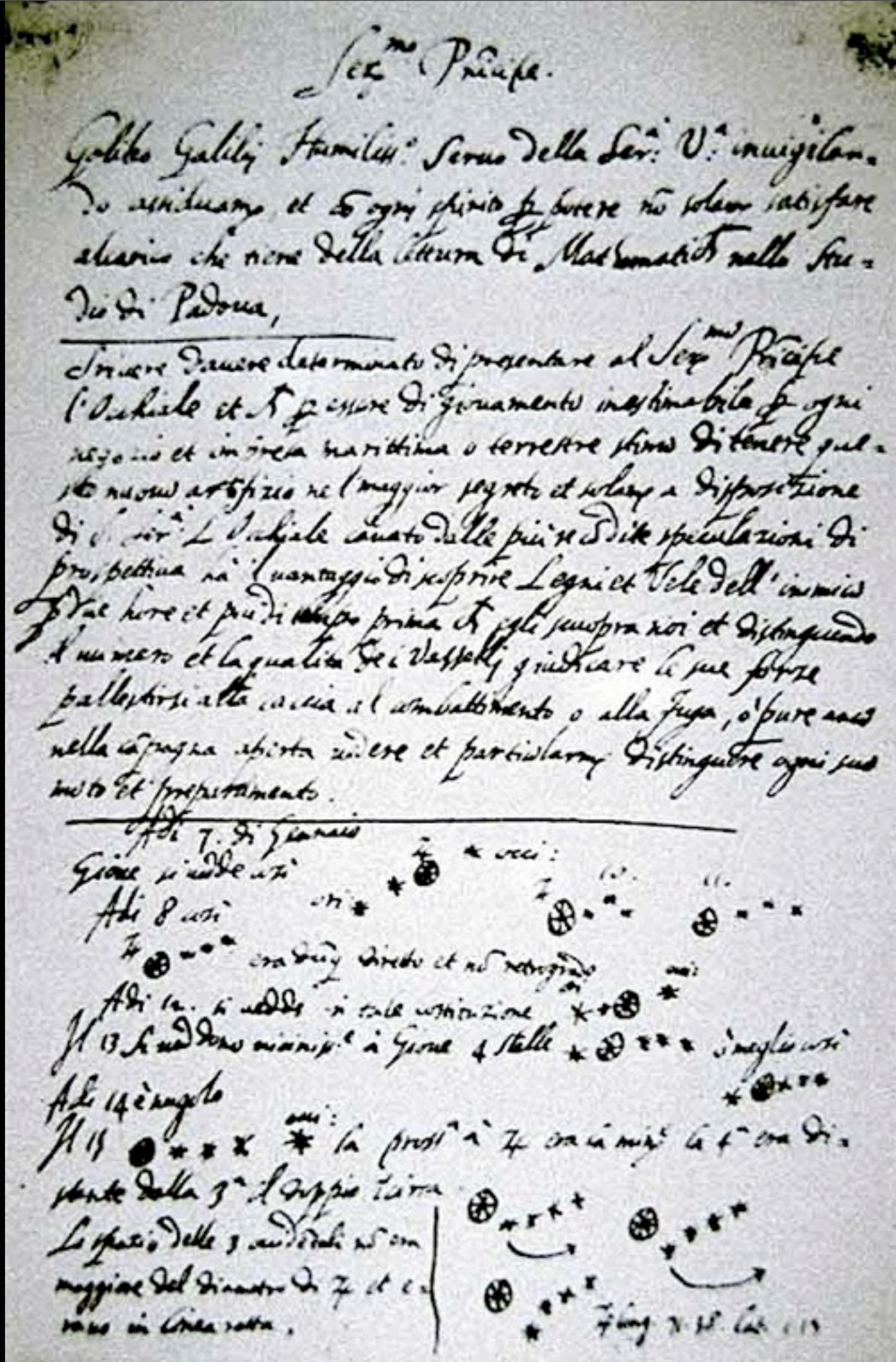
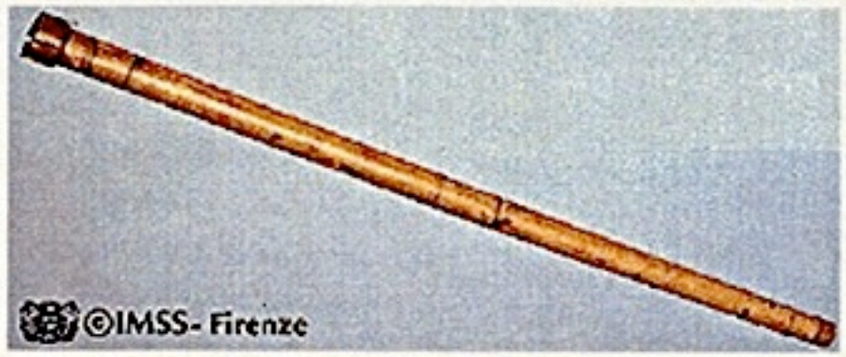
1609, Venice



This is an image of a letter written by Galileo Galilei in August 1609 to Leonardo Donato, Doge of Venice, "In 1609 [Galileo] received a description of a telescope which had been developed the year before in the Dutch town of Middelburg by an optician, one Jan Lippershey. Applying his knowledge of optical science, Galileo built such a glass or telescope for himself, and in the draft letter shown above offers his new "occhiale" to the Doge of Venice for use.

IV.18 Telescope of Galileo



c. 4.5 feet

Seventeenth Century. Wood, paper. Length: 1360mm

This wooden tube covered with paper is equipped with an objective bi-convex lens and a plano-convex eyepiece. It magnifies 14 times. The objective lens of this telescope has a focal distance of 1330mm and a useful aperture of 26mm. Shortly after making his famous astronomical discoveries, Galileo made or had craftsmen make several telescopes. Only a few of these can be identified with certainty. This one and the telescope IV.19 that is covered with red leather were undoubtedly his own. They became the property of Prince Leopoldo and became part of the Medici collection after Leopoldo's death in 1675. In the part of the ceiling of the Galleria

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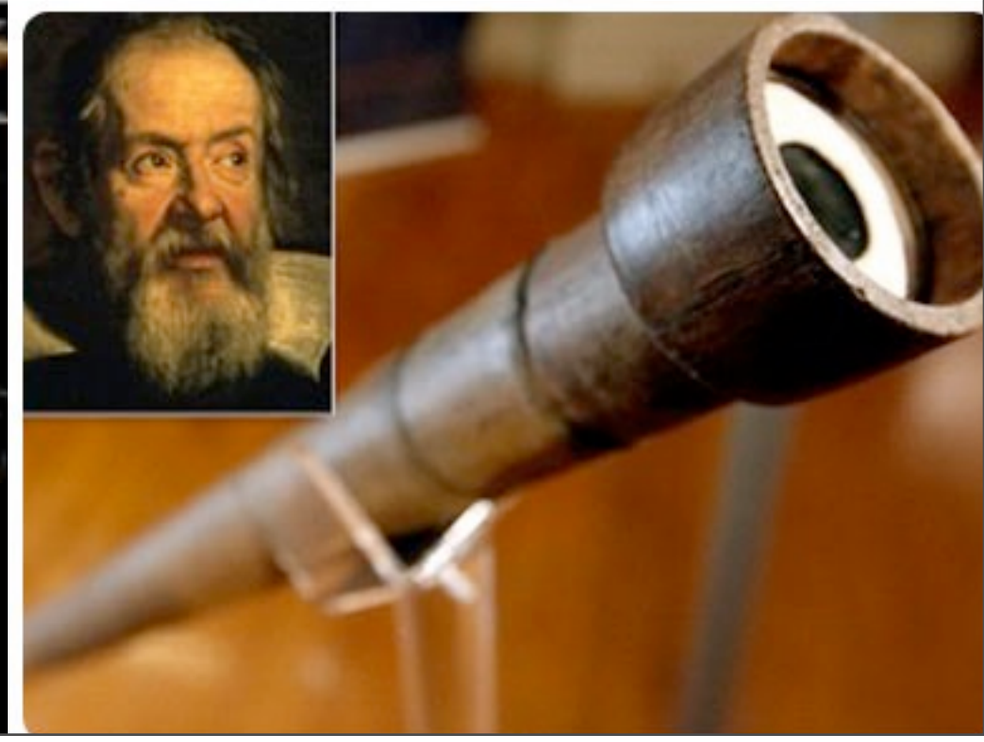
The Telescope: Observing and Measuring Astronomical Phenomena

Although the first "spyglasses" were fabricated in Holland in the early 17th century, Galileo alone realized their astronomical potential. He perfected the telescope, improving it to a magnifying power of 20 and transforming it into a measuring device. With his telescopes Galileo managed to tabulate the orbital periods of Jupiter's satellites. He designed the jovilabe and was confident that the instrument, in combination with a clock featuring an innovative pendulum escapement, would enable him to solve the quest for longitude at sea.



SaturdayMay 23, 2020

<u>1610 (March)</u>
published in Venice,
The Starry Messenger

finds moon not smooth/finds satellites around Jupiter
VIOLENT REACTION
both positive and negative because of implications for whole Aristotelian phil/
if one piece fell it all fell.
fan letters pour in to Padua.
WHAT HAD HE FOUND:

1)moon/craters/mountains (not perfect as per Aristotle)
2)satellites around Jupiter (Aristotle didnt know)
3)the Milky Way...infinite

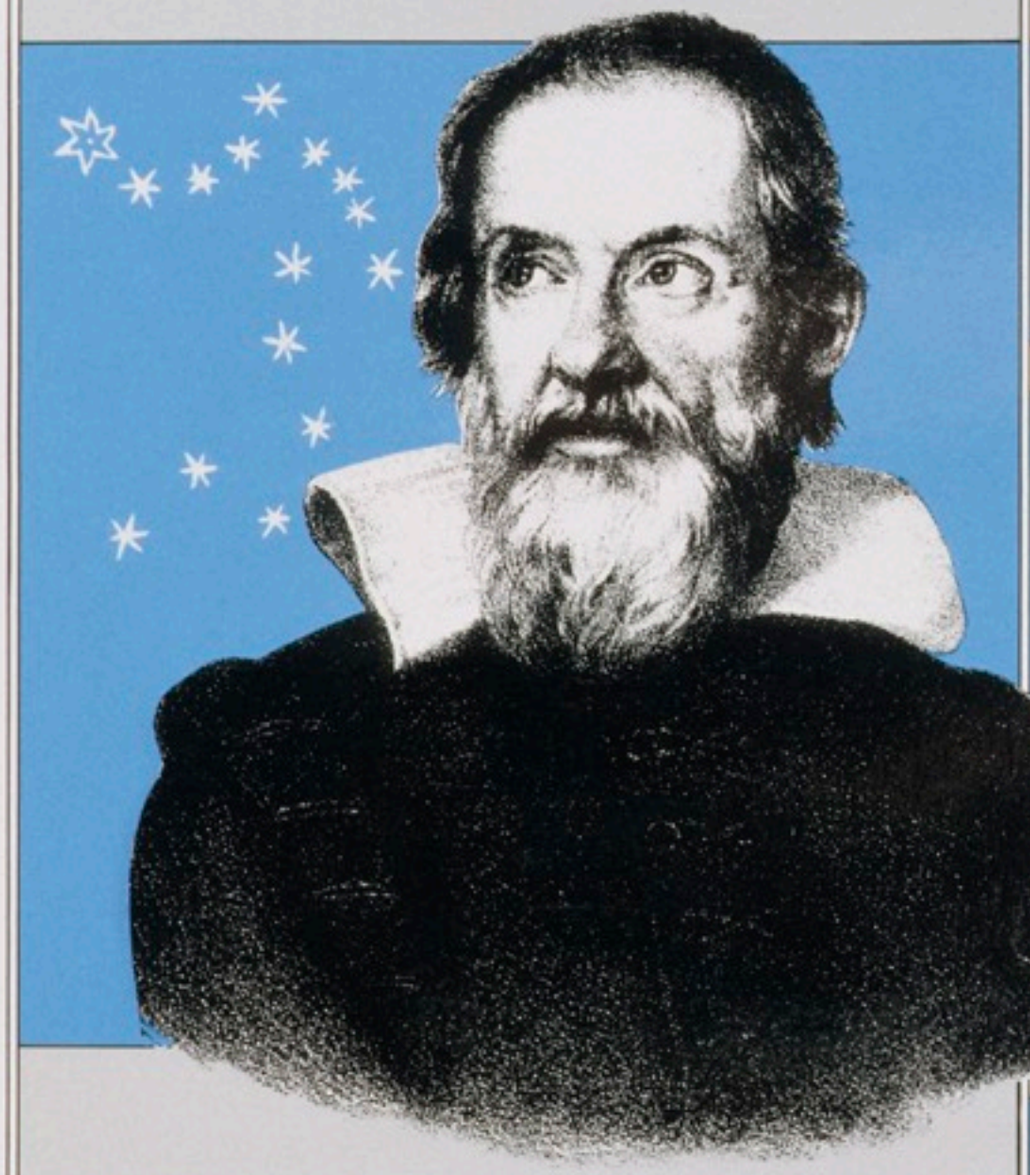
"All the disputes which have tormented philosophers through so many ages are exploded at once by the irrefutable evidence of our eyes, and we are freed from wordy disputes upon this subject, for the Galaxy is nothing else but a mass of innumerable stars planted together in clusters. Upon whatever part of it you direct the telescope straightaway a vast crowd of stars presents itself to view..."

SIDEREUS NUNCIUS

or

THE SIDEREAL MESSENGER

GALILEO GALILEI



Translated with
introduction, conclusion, and notes by

ALBERT VAN HELDEN

Within hours after **The Starry Messanger** came off the press in Venice on March 12, 1610, the British ambassador, Sir Henry Wotton, sent a copy home to King James I and wrote the following in a cover letter to the Earl of Salisbury:

"I send herewith unto His Majesty the strangest piece of news (as I may justly call it) that he hath ever yet received from any part of the world; which is the annexed book (come abroad this very day) of the Mathematical Professor at Padua, who by the help of an optical instrument (which both enlargeth and approximateth the object) invented first in Flanders, and bettered by himself, hath discovered four new planets rolling about the sphere of Jupiter, besides many other unknown fixed stars; likewise, the true cause of the Via Lacta [Milky Way], so long searched; and lastly, that the moon is not spherical, but endued with many prominences, and, which is of all the strangest, illuminated with the solar light by reflection from the body of the earth, as he seemeth to say. So as upon the whole subject he hath first overthrown all former astronomy– for we must have a new sphere to save the appearances–and next all astrology. For the virtue of these new planets must needs vary the judicial part, and why may there not yet be more? These things I have been bold thus to discourse unto your Lordship, whereof here all corners are full. And the author runneth a fortune to be either exceeding famous or exceeding ridiculous. By the next ship your Lordship shall receive from me one of the above instruments, as it is bettered by this man."

SIDEREAL MESSENGER
unfolding great and very wonderful sights
and displaying to the gaze of everyone,
but especially philosophers and astronomers,
the things that were observed by
GALILEO GALILEI,
Florentine patrician[1]
and public mathematician of the University of Padua,
with the help of a spyglass[2] lately devised[3] by him,
about the face of the Moon, countless fixed stars,
the Milky Way, nebulous stars,
but especially about
four planets
flying around the star of Jupiter at unequal intervals
and periods with wonderful swiftness;
which, unknown by anyone until this day,
the first author detected recently
and decided to name
MEDICEAN STARS[4]

1. Galileo came from a Florentine family that can be traced back to the thirteenth century. His ancestors included several members of the governing council of the Florentine Republic and a celebrated physician. His family tree can be found in *Opere*, 19:17. See also Stillman Drake, *Galileo at Work*, 448.

2. The Latin word used here is *perspicillum*. Galileo used the Italian word *occhiale* to describe the instrument. I have translated these terms as *spyglass* throughout. The word *telescope* was unveiled only in 1611. See p. 112, below.

3. Galileo used the Latin word *reperti*, from the verb *reperio*. This word can mean both *invented* and *devised*. Although Galileo was often accused of claiming he actually invented (in our sense) the telescope, this is clearly a calumny, as demonstrated by the passage on pp. 36–37, below. See Edward Rosen, "Did Galileo Claim He Invented the Telescope?" *Proceedings of the American Philosophical Society* 98 (1954): 304–12.

4. Galileo referred to Jupiter's satellites as both "planets" and "stars." In the old terminology, based on Aristotelian cosmology, both terms were correct. See also note 31, p. 15.

SIDEREVS
NVNCIVS
MAGNA, LONGEQVE ADMIRABILIA
Spectacula pandens, suspiciendaque proponens
vnicuique, præsertim verò
PHILOSOPHIS, atq; ASTRONOMIS, quæ à
GALILEO GALILEO
PATRITIO FLORENTINO
Patauini Gymnasij Publico Mathematico
PERSPICILLI
Nuper à se reperti beneficio sunt obseruata in LVNÆ FACIE, FIXIS IN-NVMERIS, LACTEO CIRCVLO, STELLIS NEBVLOSIS,
Apprime verò in
QVATVOR PLANETIS
Circa IOVIS Stellam disparibus interuallis, atque periodis, celeritate mirabili circumuolutis; quos, nemini in hanc vsque diem cognitos, nouissimè Author deprehendit primus; atque
MEDICEA SIDERA
NVNCVPANDOS DECREVIT.

VENETIIS, Apud Thomam Baglionum. M DC X.
Superiorum Permissu, & Privilegio.

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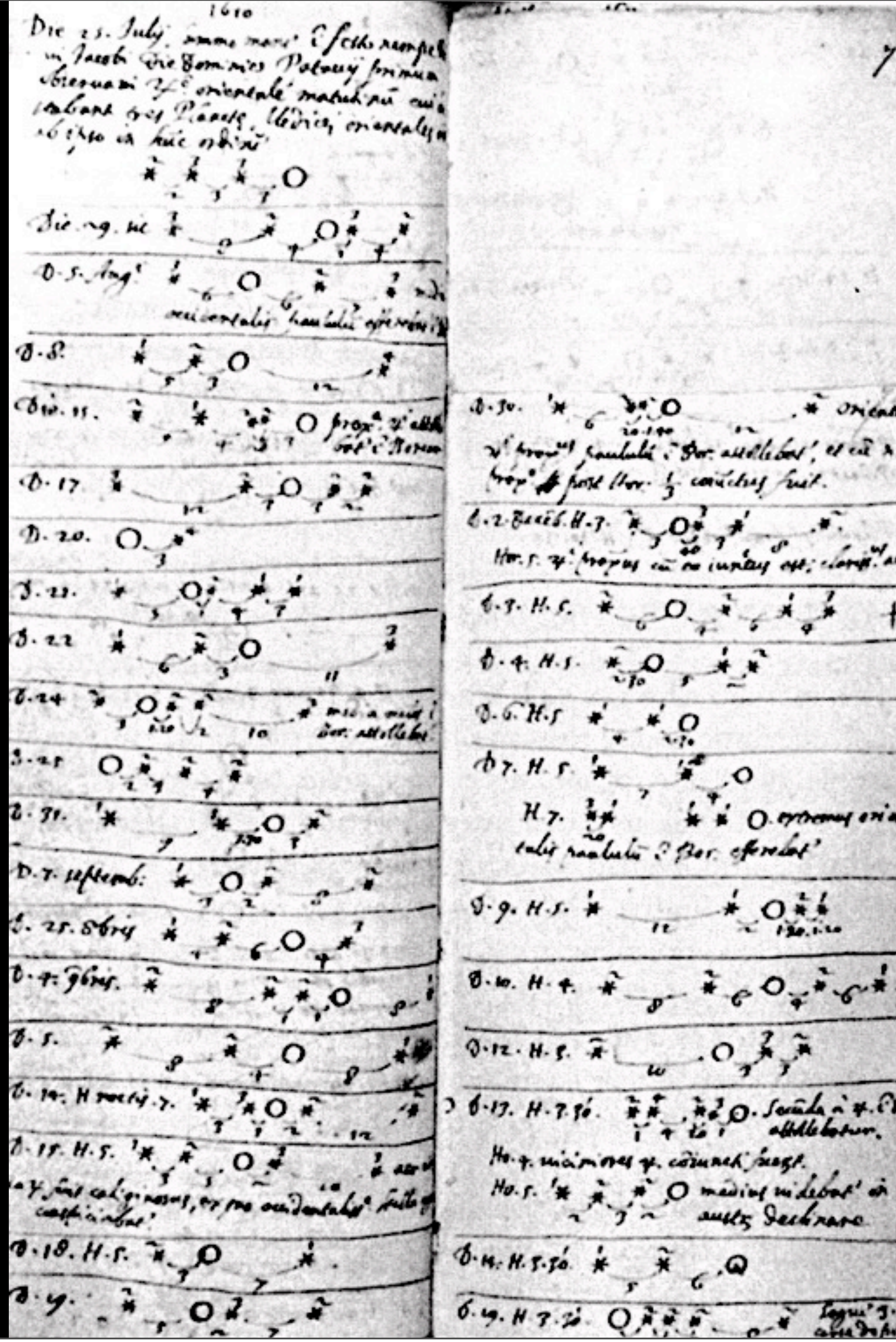
1610
Die 25. July
D. 5. Aug.
D. 8.
D. 17.
D. 20.
D. 22
D. 4. H. 5.
D. 6. H. 5
D. 7. H. 5.
H. 7.
D. 9. H. 5.
D. 10. H. 4.
D. 12. H. 5.

At the University of Padua

Galileo:
"the whole university turned out, and I so convinced and satisfied everyone that in the end those very leaders who at first were my sharpest critics and the most stubborn opponents of the things I had written, seeing their case to be desperate and in fact lost, stated publicly that they are not only pursuaded but are ready to defend and support my teachings against any philosopher who dares to attack them."

but the opposition grew:

a critic on the Moon:

"Being ingenerable, incorruptible, inalterable, invariant, eternal, etc., implies that celestial bodies are absolutely perfect; and being absolutely perfect entails their having all kinds of perfection. Therefore their shape is also perfect; that is to say, spherical – and absolutely and perfectly spherical, not approximately and irregularly." (as Aristotle had said....)

The Aristotelians

1600-1650 under siege. (Descartes/Bacon/Copernicus/Kepler/Galileo)

ARISTOTELIANS KNEW THEY COULD NOT GRANT ANY DEVIATION FROM WHOLE PHIL OTHERWISE WHOLE STRUCTURE WOULD COLLAPSE.

THEY WERE RIGHT.

Galileo:
"These doctors of philosophy never concede the moon to be less polished than a mirror; they want it to be more so, if that can be imagined, for they deem that only perfect shapes can suit perfect bodies. Hence the sphericity of the heavenly globes must be absolute. Otherwise, if they were to concede me any inequality, even the slightest, I would grasp without scruple for some other, a little greater, for since perfection consists in indivisibles, a hair spoils it as much as a mountain." (Dialogues)

But not only would they not grant him his argument,
they WOULD NOT LOOK INTO THE TELESCOPE
so his opponent at Padua, Cremonini refused.

The philosophical debate: The Philosophers (Aristotelians)

the Ptolemaic Opposition, Jean Bodin, French phil:

"No one in his senses or imbued with the slightest knowledge of physics, will ever think that the earth, heavy and unwieldy from its own weight and mass, staggers up and down around its own center and that of the sun; for at the slightest jar of the earth, we would see cities and fortresses, towns, and mountains thrown down.....For if the earth were to be moved, neither arrow shot straight up, nor stone dropped from the top of a tower would fall perpendicularly, but either ahead or behind.....Lastly, all things on finding places suitable to their natures, remain there, as Aristotle writes. Since therefore the earth has been allotted a place fitting its nature, it cannot be whirled around by other motion than its own."

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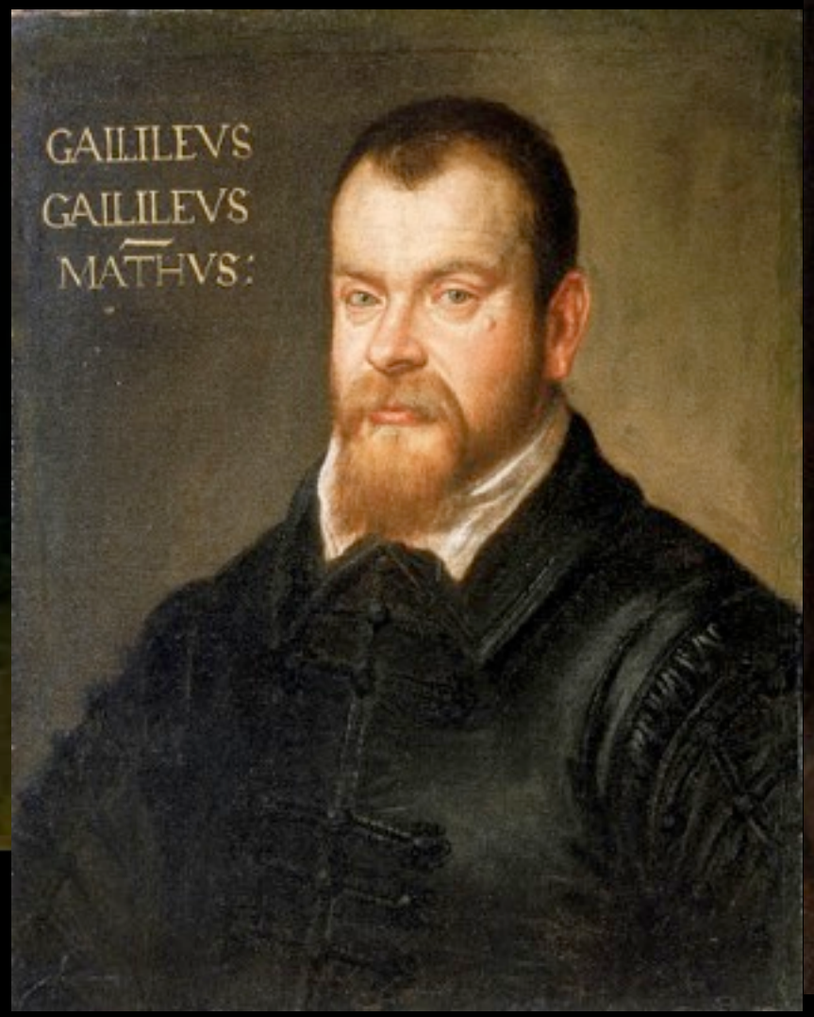
1610 PERSONAL CRISIS
MARINA GAMBA of VENICE
AND HIS DAUGHTERS
(Later Suore Maria Celeste)




1610, Grand Duke of Tuscany Medici Invites Galileo to Flo

The Florentine Years 1610-1632

invited back to Florence by Medici, given house
Now the international controversy grew more heated.
The essence of the debate was Galileo's public acceptance of the Copernican theory after the publication of his Starry Messenger.

Now what had been only a dull academic theory suddenly became real.

success of Starry Messenger

Galileo Becomes International Rock Star of Stars

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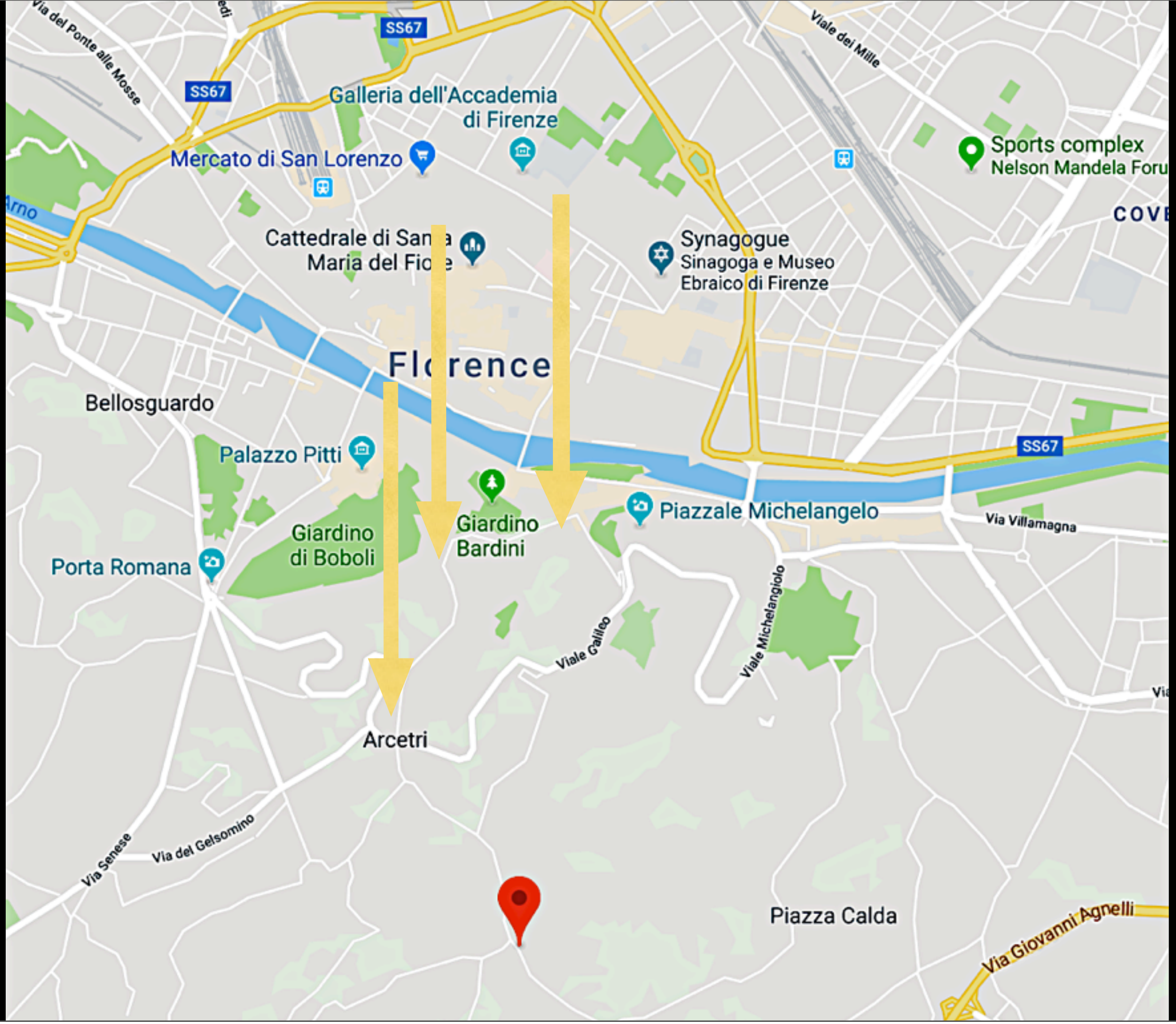
Pian dei Giulari, hilltop of the minstrels


SS67
SS67
Via del Ponte alle Mosse
Galleria dell'Accademia
di Firenze
Mercato di San Lorenzo
Viale dei Mille
Sports complex
Nelson Mandela Foru
Cattedrale di San
Maria del Fio
Synagogue
Sinagoga e Museo
Ebraico di Firenze
Florence
Bellosguardo
Palazzo Pitti
SS67
Piazzale Michelangelo
Via Villamagna
Giardino
di Boboli
Giardino
Bardini
Porta Romana
Viale Galileo
Viale Michelangiolo
Arcetri
Via Senese
Via del Gelsomino
Piazza Calda
Via Giovanni Agnelli

Pian dei Giulari, hilltop of the minstrels (Arcetri)

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Trattoria
Omero
Via Pian Dei
Giullari,

Trattoria
Omero
Via Pian Dei
Giullari,

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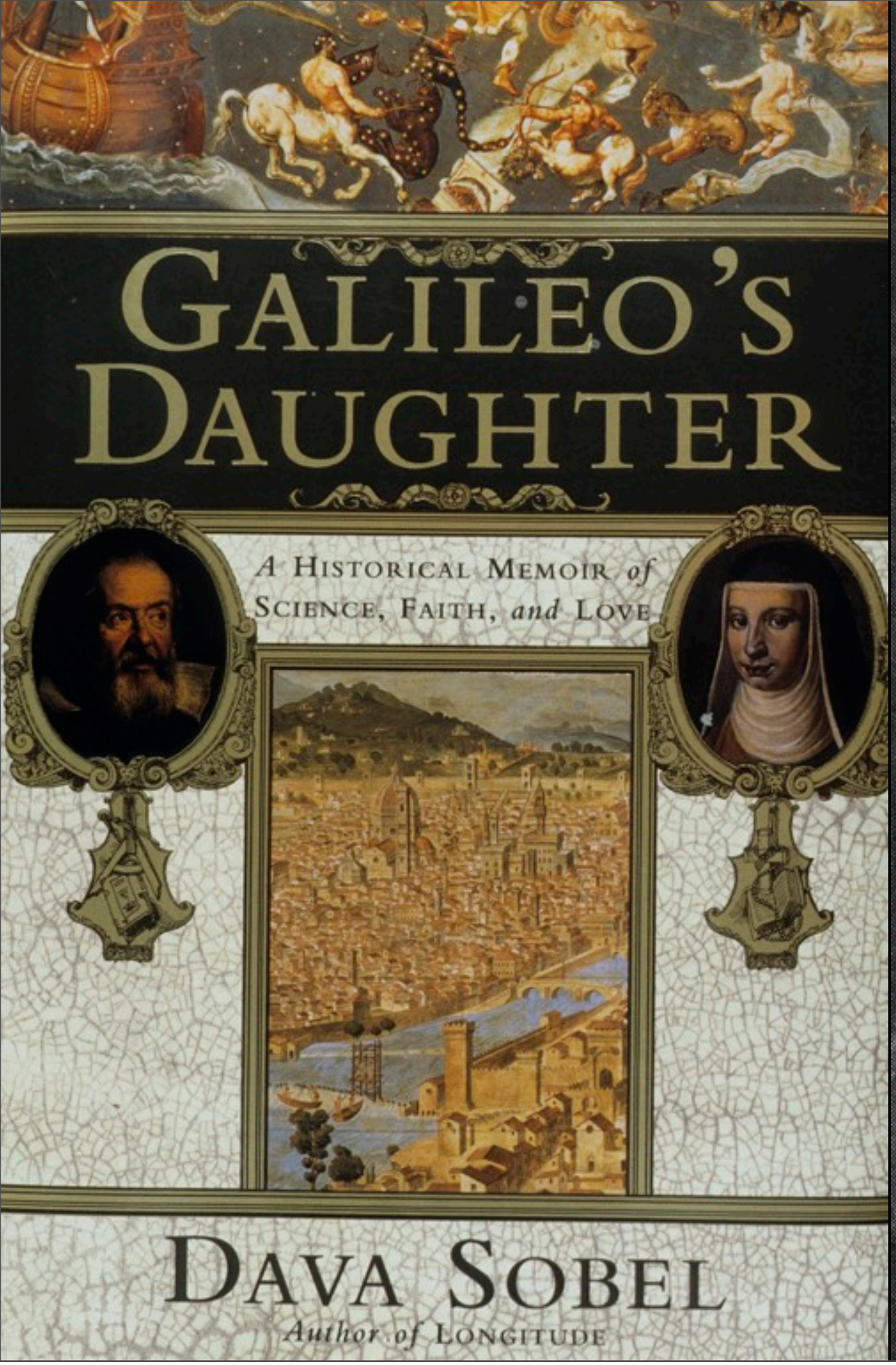
Via San Matteo in Arcetri


San Matteo in Arcetri



GALILEO'S DAUGHTER

A HISTORICAL MEMOIR *of* SCIENCE, FAITH, *and* LOVE

DAVA SOBEL

Author of LONGITUDE

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Molto Ill.re et Amatiss.mo Sig.r Padre

Ho letto con un gusto grandiss.mo le belle lre da lei mandatemi, la ringra=
tio, e gl'ene rimando, col pregarla però d'haverne per l'avvenire a veder
dell'altre; mandogli appresso una lra di Vincentio, acciò che col suo
comodo glela mandi. Ringratio il Sig.re et mi rallegro con lei del
suo miglioramento, et la prego à riguardarsi più che gl'è possibile,
fino à tanto che non racquisti la desiderata sanità; la ringratio
delle sue troppe amorevolezze, che in vero mentre che è malato non
vorrei che di noi si pigliassi tanto pensiero. La saluto con ogni
affetto, insieme con S.r Arcang.la et da Nro Sig.re gli prego abondanza
della sua gratia. Di S. Matteo il dì ultimo d'Ag.to 1629

Di V.S. molto Ill.re

Aff.ma Fig.la

S. M.a Celeste G.

SaturdayMay 23, 2020

Florence Summer 1632

Publication and the Dangers in 1630s

Censorship in Post-Council of Trent Atmosphere

all books on any topic had to be submitted to the church censor.

this followed a bull from Pope Leo X 1515.

all books had to be submitted to the local bishop or appointees.

printers who printed a book without the papal imprimatur risked excommunication, fines and the burning of their books.

another bull of 1520 from Pope Leo X prohibited the publication of all books past or future from the pen of Martin Luther.

in 1542 the Roman Inquisition assumed supervision of all books printed in Italy & in 1559 promulgated first list of Prohibited Books.

1564 harsher penalties were imposed and authors as well as printers could be excommunicated for publishing books heretical

EVEN READERS of such texts could be punished.

booksellers had to beware and had to keep a complete of all their stock ready for any inspection by a bishop.

All of Galileo's previous books had undergone the requisite inspection. bookprinters were esp vigilant in Italy home of the Inquisition and esp Rome.

The Starry Messenger had been approved by the local Venetian authorities as well as the authorities in University of Padua. The Sunspot Letters were carefully discussed with Cardinal Bellarmine and this book along with the Assayer had been appropriately approved by the censors.

DIALOGO
DI
GALILEO GALILEI LINCEO
MATEMATICO SOPRAORDINARIO
DELLO STVDIO DI PISA.
E Filosofo, e Matematico primario del
SERENISSIMO
GR. DVCA DI TOSCANA.

Doue ne i congressi di quattro giornate si discorre sopra i due

MASSIMI SISTEMI DEL MONDO
TOLEMAICO, E COPERNICANO,

Proponendo indeterminatamente le ragioni Filosofiche, e Naturali tanto per l'vna, quanto per l'altra parte.

CON PRI VILEGI.

IN FIORENZA, Per Gio: Batista Landini MDCXXXII.
CON LICENZA DE' SVPERIORI.

The book that sealed his fate --

Galileo put the words of Pope Urban VIII (Mafeo Barberini) in the mouth of fictional character Simplicius (Simpleton) and lost the Pope's protection. The Inquisition soon reels him in. House arrest follows.

DIALOGO
di
GALILEO GALILEI LINCEO
AL SER.mo FERD. II. GRAN. DVCA DI
TOSCANA

POPE URBAN VIII
Mafeo Barberini

VRBANVS VIII. BARBERINVS PONT. MAX

Urban VIII in the first year of his pontificate

1632-33 TROUBLE IN ROME

During this time (1630s), Pope Urban had begun to fall more and more under the influence of court intrigue and problems of state. His friendship with Galileo began to take second place to his feelings of persecution and fear for his own life. At this low point in Urban's life, the problem of Galileo was presented to the pope by court insiders and enemies of Galileo. Coming on top of the recent claim by the then Spanish cardinal that Urban was soft on defending the church, he reacted out of anger and fear. This situation did not bode well for Galileo's defence of his book. Earlier, Pope Urban VIII had personally asked Galileo to give arguments for and against heliocentrism in the book, and to be careful not to advocate heliocentrism. He made another request, that his own views on the matter be included in Galileo's book. Only the latter of those requests was fulfilled by Galileo. Whether unknowingly or deliberately, **Simplicio**, the defender of the Aristotelian Geocentric view in *Dialogue Concerning the Two Chief World Systems*, was **often caught in his own errors and sometimes came across as a fool.** Indeed, although Galileo states in the preface of his book that the character is named after a famous Aristotelian philosopher (Simplicius in Latin, Simplicio in Italian), the name "Simplicio" in Italian also has the connotation of "simpleton". This portrayal of Simplicio made *Dialogue Concerning the Two Chief World Systems* appear as an advocacy book: an attack on Aristotelian geocentrism and defence of the Copernican theory. Unfortunately for his relationship with the Pope, Galileo put the words of Urban VIII into the mouth of Simplicio. Most historians agree Galileo did not act out of malice and felt blindsided by the reaction to his book. However, the Pope did not take the suspected public ridicule lightly, nor the Copernican advocacy. Galileo had alienated one of his biggest and most powerful supporters, the Pope, and was called to Rome to defend his writings.

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Feb 17, 1600, Giordano Bruno Burned at Stake "Heresy"

September 1632, Galileo was ordered to come to Rome to stand trial. He finally arrived in February 1633 and was brought before inquisitor Vincenzo Maculani to be charged.

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The Trial of Galileo
June 1633

The sentence of the Inquisition was delivered on June 22.
It was in three essential parts:

- Galileo was found "vehemently suspect of heresy", namely of having held the opinions that the Sun lies motionless at the centre of the universe, that the Earth is not at its centre and moves, and that one ma hold and defend an opinion as probable after it has been declared contrary to Holy Scripture. He was required to "abjure, curse and detest" those opinions.

- He was sentenced to formal imprisonment at the pleasure of the Inquisition. On the following day this was commuted to house arrest, which he remained under for the rest of his life.

- His offending *Dialogue* was banned;

The Abjuration

"I Galileo, son of the late Vincenzio Galilei, Florentine, aged seventy years, arraigned personally before this tribunal and kneeling before you, most eminent and lord cardinals Inquisitors General against heretical pravity throughout the entire Christian Commonwealth, having before my eyes and touching with my hands the Holy Gospels, swear that I have always believed, do believe, and with Gods help will in the future believe all that is held, preached and taught by the Holy Catholic and Apostolic Church. But, whereas, after an injunction had been lawfully intimated to me by this Holy Office to the effect that I must altogether abandon the false opinion that the sun is the center of the world and immobile, and that the earth is not the center of the world and moves, and that I must not hold, defend, or teach, in any way, verbally or in writing, the said false doctrine, and after it had been notified to me that the said doctrine was contrary to Holy Scripture, I wrote and printed a book in which I treated this new doctrine already condemned and brought forth arguments in its favor without presenting any solution for them, I have been judged to be vehemently suspected of heresy, that is, of having held and believed that the sun is the center of the world and immobile and that the earth is not the center and moves.

Therefore, desiring to remove from the minds of Your Eminences, and all faithful Christians, this vehement suspicion rightly conceived against me, with sincere heart and unpretended faith I abjure, curse, and detest the aforesaid errors and heresies and also every other error and sect whatever, contrary to the Holy Church, and I swear that in the future I will never again say or assert verbally or in writing, anything that might cause a similar suspicion toward me; further, should I know any heretic or person suspected of heresy, I will denounce him to this Holy Office or to the Inquisitor or Ordinary of the place where I may be.

Rome, June 22, 1633.

io eccedessi in qualche parte come ho già detto presento questa
scrittura con una fede aggiunta del già Ill.mo S. Card.le Bellar
mino scritta di propria mano del med.o S. Card.le della quale già
presentai una copia di mia mano. Del rimanente mi rimetto in
tutto, e per tutto alla solita pietà, e clemenza di questo Trib.le
et habita eius subscriptione fuit remissus ad domum suph.i
Orris Ecc.mi Magni Ducis modo, et forma iam sibi notificatis.

Io Galileo Galilei mano p.a


The Trial of Galileo
June 1633

Cardinal from Siena (Piccolomini) arranged for Galileo to be allowed to return to Florence under house arrest

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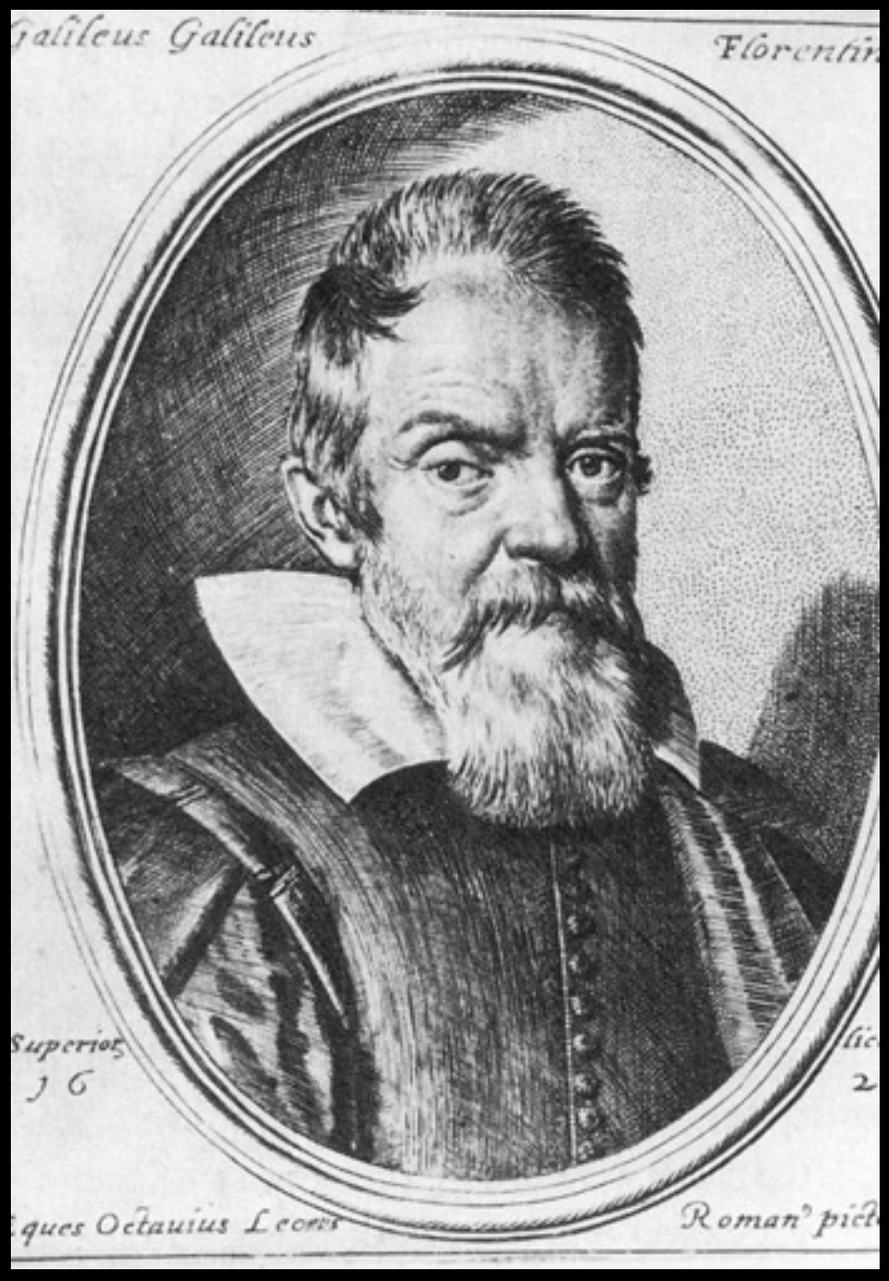
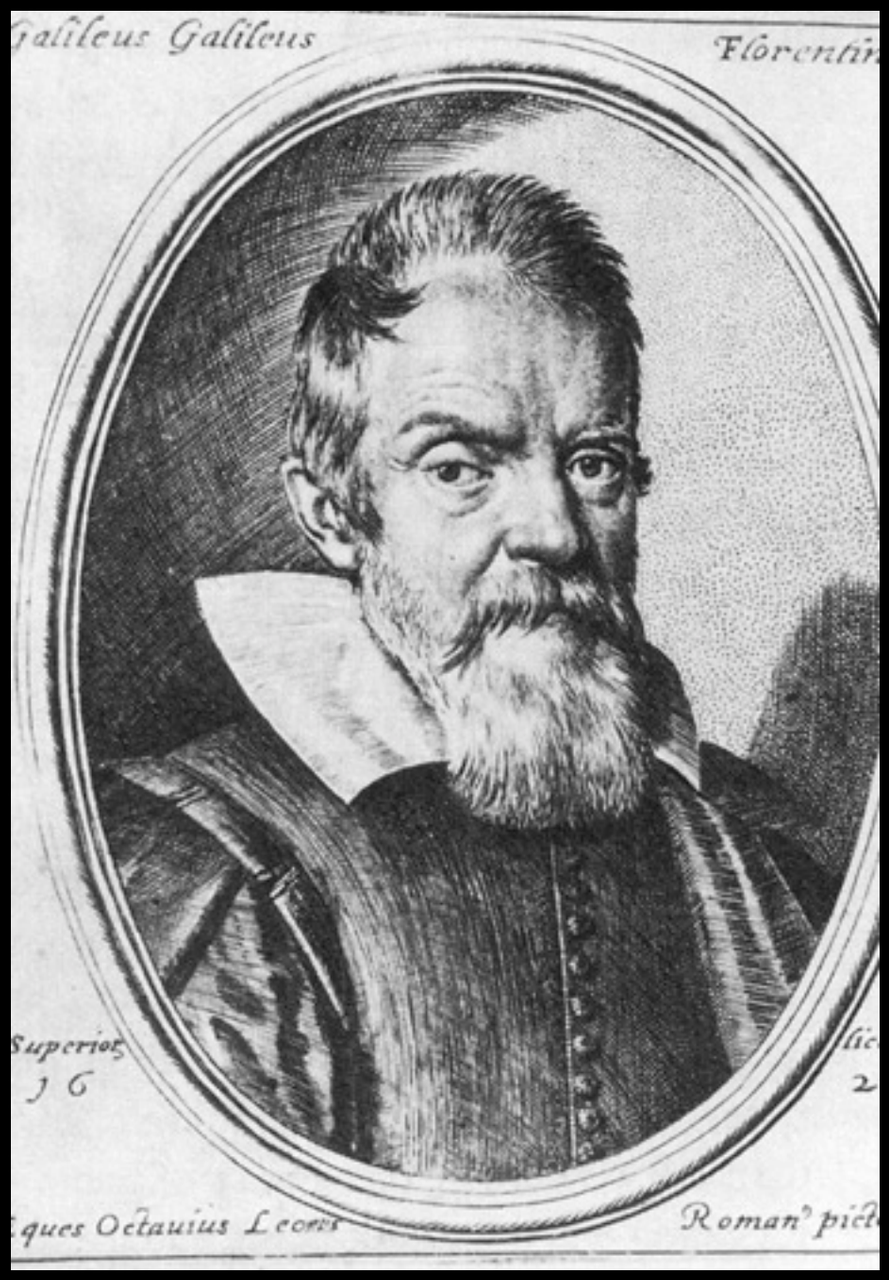
Death of Suore Maria Celeste
August 16, 1600 – April 2, 1634


Galileus
Florentin
auius Leoni
Roman pict



1638, Galileo completely blind: "Alas your friend and servant Galileo has for the last month been irremediably blind, so that this heaven, this earth, this universe which I, by my remarkable discoveries and clear demonstrations had enlarged a hundred times beyond what has been believed by wise men of past ages, for me is from this time forth shrunk into so small a space as to be filled by my own sensations."



Jan 8, 1642, Galileo Died. "Today news has come of the loss of Signor Galilei, which touches not just Florence but the whole world, and our whole century which from this divine man has received more splendor than from almost all the other ordinary philosophers. Now, envy ceasing, the sublimity of that intellect will begin to be known which will serve all posterity as guide in the seach for truth."(Luke Holste,).
Dec 25, 1642 Birth of Isaac Newton

Galileo Galilei, 1564 to January 8, 1642

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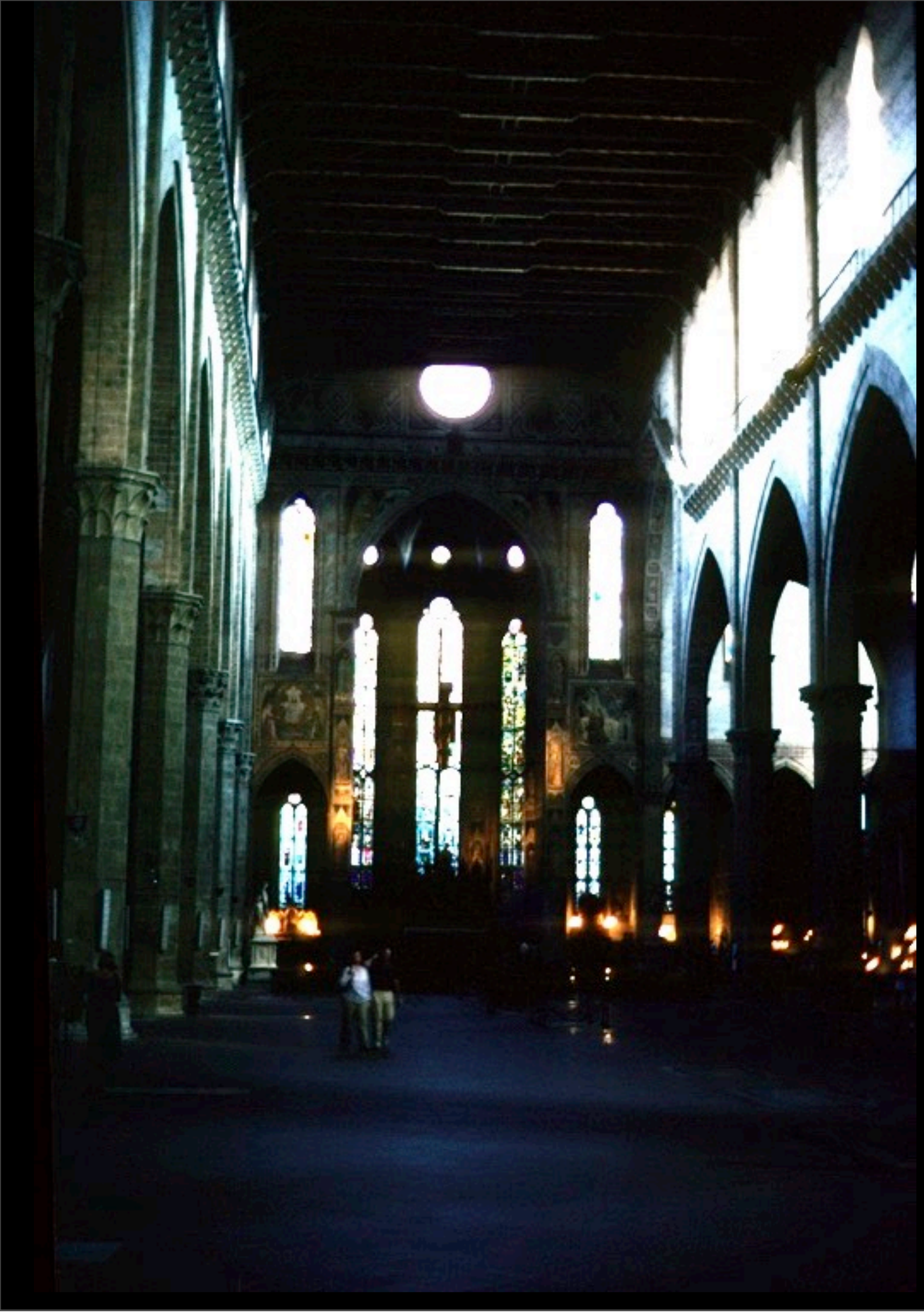

Galileo Galilei, 1564-1642 (78)

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